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EDITORIAL NOTES—GAS, &c.

Next Coal Contract Prices.

THE question of the hour is not what is to be the trend of gas coal prices, but how far are they likely to drop? The coal owners are playing a waiting game. They know that gas coal prices will have to go considerably below quoted figures; but quite naturally they want to keep prices as high as possible, and net as many contracts as fortune and the undue haste of buyers will allow them to at better prices than those that are likely to rule before the world is many weeks older. Feelers are being put out from the coal centres to ascertain the position before ceding further reductions in quotation; but there is visible, particularly in the Durham coal-fields, an amount of uneasiness at the reticence of buyers to even negotiate, much less enter into bargains. In the Yorkshire and Derbyshire districts, the owners are not conducting themselves altogether diplomatically. They are still busy with the unprecedented gas coal contracts placed with them last year, when many gas undertakings deliberately diverted their customary purchases from Durham. Rejoicing still in their good fortune, the Yorkshire and Derbyshire owners are talking among themselves of even asking an advance on present contract prices. Asking is altogether a different matter from receiving; and with generally declining trade, and it is confidently expected of export business, there will be such a margin of coal released, that the southern gas undertakings will be in a better position even than they were last year for placing their orders wherever they choose. There is a positive weakness in Durham coals; and no doubt Durham coal owners will be very pleased indeed to recover what they lost last year, for Yorkshire's gain was undoubtedly to their heavy detriment. Speaking at the meeting of the South Suburban Gas Company on Friday, Sir George Livesey ridiculed any notion of considering even such a price as 10s. for Newcastle coals in the coming contract season; 10s. being some 33 per cent. above prices ruling three years ago. Not only are all the general conditions favourable to much lower prices, but there are so many of the gas undertakings dependent on railway carriage that, for protective purposes, stocked largely last year under the stimulation of a menaced railway strike, and that are to-day in a particularly comfortable position. This makes immediate coal selling all the more difficult. Sir George's advice to gas coal buyers is "Do not be in a hurry." We have an idea that this year gas undertakings will prove themselves just as sagacious opportunists as the coal owners far north proved themselves to be last year.

There was a second matter affecting coal that Sir George dwelt upon at the meeting of the South Suburban Gas Company, and that was the Coal Miners' Eight-Hours Bill. He commends the coal owners for the consideration they evinced for the coal consumers in approaching the Home Secretary, and spreading before him the evils that the passing of the Bill would inflict. Wherefore this sudden concern of the coal owners in the consumers? There was no particular regard for them last year; and chauvinism (applying the convenient expression to the occasion and to this country) was not then a particularly characteristic feature in their operations. No; the fact of the matter is the concern of many of the coal owners is concentrated in the curtailing of their own liberty by the measure; the fiction of a disinterested regard for industrial and private consumers is for those who choose to swallow it. At the same time, the coal owners' liberty is of greater advantage to the consumer than the deliberate tying of their hands; and therefore it is to the interest of all consumers to do what they can to resist a measure that is unnecessary from all points of view, and one that can have no effect but such as is diametrically opposed to the best interests of the country. If evidence were required of how strongly the instinct of self preservation and protection is developed in the coal owners, it is seen in the taking-time-by-the-forelock clause that they are contemplating inserting in contracts this year in connection with the Eight-Hours Bill. It is the revival of the contract clause about which there was talk last year, and which we believe did actually find its way into certain contracts. The clause provides for an increase in contract prices should the Eight-Hours Bill pass, with option to the buyers to cancel contracts. The increase mentioned is 1s. 6d. per ton, and that is the figure which was stated to Mr. Gladstone by the coal owners as being the estimated additional cost of coal-getting that would be occasioned by the passing of the Bill. We do not understand that the coal owners propose that any provision should be made in contracts to guard against penalties for non-delivery through the volume of output being in any way affected by the passing of the measure. The peril of shortage does not appear to be very great; but the danger of greater costs is a very real and ugly one. With regard to Sir George's point as to the Bill being a first step in the socialistic plan for the absorption of the unemployed (which plan does not have any regard for the external influences that will be created, and which will tend, by increasing cost and reducing buying power, to produce further unemployment), he manifestly overlooks Mr. Will Thorne's drastic measure, epitomized in another column, which contemplates a universal eight-hour day, and so would, if passed, deprive of their preference those gas stokers who, for various well-known financial and working reasons, favour the twelve-hour to the eight-hour shift.

Disposing of Gasholder Tank Water.

THE protracted proceedings in the action brought against the South Suburban Gas Company by the Lewisham Borough Council, at the instance of a number of ratepayers, has ended in a judgment by the learned Magistrate (Mr. Cecil Chapman) that, it will be conceded by all who have followed the evidence as placed before the Court by Sir Charles Mathews for the Company and Mr. A. H. Poyser for the Council, shows an enlightened appreciation of an issue much entangled in general and technical detail. It was a case in which complaint had been made to the Council by ratepayers, in form as required by statute, of a nuisance emanating from the gas-works. The Council were consequently bound to investigate the matter; hence the proceedings before the Magistrate. At the time, the Company were engaged in enlarging two gasholders of considerable size, and, for the purpose, followed the approved and customary course of pumping the water from the tanks, through closed pipes, into the sewers. All the usual precautions were taken to avoid nuisance. The investigation on the part of the Council was, at the outset, directed to ascertaining whether the nuisance complained of was of a temporary character proceeding from the work of emptying the holder tanks, or whether it arose in the course of the ordinary operations of gas manufacture. Those of our readers who have impartially considered the evidence will have had no difficulty, as the Magistrate had not, in concluding that there was a nuisance from the gas-works, that it did not arise from the ordinary processes, but that it was something abnormal, and occurred simultaneously with the emptying of the holder tanks. The Engineer of the Company (Mr. S. Y. Shoubridge) was under the impression that the smells complained of did not proceed from anything that was being done at the gas-works, but that there was a greater probability, on the evidence before him, that the effluvia arose from the manholes in the sewerage system. Differing from the Magistrate, we are of opinion that in part Mr. Shoubridge was right and in part wrong. Applying to his evidence the experience, related by Sir George Livesey at the hearing last Thursday, in the emptying of holders at Kennington and complaints arising of an abnormal smell from the sewers at Brixton, it seems a fair inference that the action set up in the sewers (by the intermingling of the foul tank water with the ordinary contents of the sewers) between

Kennington and Brixton which caused the extraordinary smell was repeated at Sydenham, and that the sewers acted as transmitters of the smell to the part of the district from which complaint emanated.

It was no reflection on Sir George Livesey, Mr. Charles Carpenter, and Mr. Shoubridge when his Worship said that he thought the nuisance was a greater one than they had admitted. "Familiarity breeds contempt;" and in and near to a gas-works the olfactory organs of a lay visitor would be more easily offended than would be those of men whose professional lives are spent in the midst of gas-works operations. Moreover, if the supposition that Sir George draws from the Kennington-Brixton experience has good foundation, the accentuated odour would have been removed from Mr. Shoubridge's direct cognizance.

Having arrived at the conclusion that the emptying of the gasholder tanks was the cause of the nuisance complained of, the next point was whether the Company had used all practicable means—"all," to use the words of his Worship, "they "could do, and all that was known at the date they com- "menced operations"—to avoid nuisance in the execution of a necessary work. It was clear that they had; and that there was no negligence or oversight to cloak. His Worship was fully convinced of this, and emphatically declared that the Company had discharged the onus put upon them of showing that they had employed all known "practicable means" of obviating nuisance to their neighbours. In the evidence that satisfied his Worship of this, and in the expert—or, as the Magistrate described it, the "theoretical"—evidence put before the Court by the Council, is found matter of considerable interest to gas engineers who may be called upon in future to dispose of holder tank water that has become fouled by many years' use, and particularly of water in the tanks of holders in which carburetted water gas or an admixture of coal and carburetted water gas has been stored. We will not say that certain of the suggestions of Mr. W. J. A. Butterfield and Mr. E. H. Stevenson (whose evidence greatly assisted his Worship in arriving at the judgment in the Company's favour) will not prove of value; but the only two of the suggestions that have been tried have to be proved practicable on a more extended scale than in the case of a single small relief holder at Chester (Pennsylvania) and in the other case of a holder at York. Suggestion and theory should be no more admissible as evidence, or regarded as relevant, in a Court of Law than is "hearsay" evidence; and certainly mere suggestion and theory must be dismissed, as they were dismissed by his Worship in this case, as having any weight against customary and proved practice in the carrying out of work. The customary and best known practicable means were applied in the removal of the fouled water from the gasholder tanks in question; and of this Mr. Chapman was fully satisfied. But the most practical suggestion for future consideration in attempting to mitigate any temporary nuisance which such necessary work involves is undoubtedly that of the employment of floating suctions or inverted pipes for removing the superficial film from the tank water before pumping the latter into the sewers. This is only one of several technical points which the case produced; but they are too many to pass in general review here.

While the case completely exonerates the Company, it also proves the cumbrous, inefficient, and expensive means provided by the statutes for determining whether, in a question of nuisance involving technical considerations, that nuisance was preventible or otherwise; and, if otherwise, whether the best practicable mode of doing the work had been adopted to ensure that the nuisance was kept at the minimum. In this case the Police Court proceedings were unduly prolonged by the action of the nominal plaintiffs; and a well-deserved rebuke was administered to them by his Worship. They persisted in contesting the case in Court after it was perfectly clear that the nuisance was a temporary one occasioned by pressing and necessary work, and after the experts they consulted were in a position to advise them that the customary and best known practicable means had been employed in executing the work. From the technical point of view, we are not sorry; from the point of view of his Worship, it was waste of time and money, and occasioned considerable trouble to the Company. Up to a point in the proceedings, the Council, having the duty of investigation of the complaint imposed upon them by statute, were entitled to their costs; after that point, the persistence of the Council and the character of the further evidence they adduced—untried or isolated in trial, or far-fetched—entitled the Company to their costs. Therefore the Magistrate dismissed the case, without costs, which is a reflection on the whole procedure in such cases, and hard on a Company when they have adopted the best-known practicable means of reducing a temporary—and not a continuing—nuisance to the lowest possible limit.

The Need of the Times.

In the electrical industry, the new lamps—flame arcs for outdoor purposes, and metallic filaments for indoor use—have given electricians fresh heart, and have acted as a stimulus to energy in the competition with gas for business. Let us give credit where credit is due. Some of the electricity undertakings have very comprehensive methods of prosecuting business; while others are following the lethargic demeanour that characterized the management of not a few gas undertakings some five-and-twenty years ago. But that condition cannot perpetually continue; and gas undertakings in those districts where the lethargy of opponents gives opportunity should take advantage of it to make their own position the more impregnable against the attack when the electricity management fully awakes to the need of the times, if headway is to be made in business. But there are also electricity purveyors who are very much alive in their business propaganda. Their literature is profuse, though some of it is not always honourable; their canvassing methods are systematic. Offering free assistance and advice is a great point with them; and the value of personal contact—especially with shopkeepers—is appreciated at its proper worth. In all this, many gas undertakings are not behind them; but, regretfully, we say that many are. The younger illuminant, with its drawback of higher cost, and the untoward circumstances that have given it a bad name, has had, except in the big cities and towns, an uphill task; and that very uphill task has spurred to energy in seeking development. It is well to keep these matters prominently in view, more especially at the present time when the managements of electricity undertakings have been fired to greater enthusiasm by the more efficient lamps that have, fortunately for them, come to their aid. They—or rather those of them who do not fear the revenue-reducing capacity of the lamps—will make the most of them, in trying to capture custom. They have much ground to recover, and reputations to restore; for truth runs through every line of the statement in a Shareholders' Committee's report to the meeting of Edmundson's Electricity Corporation last week, that "electricity-supply undertakings have "undoubtedly sustained a check to their profitable develop- "ment during the last three or four years. Installations "have been carried out with insufficient regard to their "profitable earning capacity. It is doubtless true, not only "that more sanguine expectations in regard to the profits of "electric lighting prevailed at the time than the event has "justified, but also, that the competition of gas, especially "in provincial towns, has proved more injurious than "appeared likely, until recently, to be the case." But frank admissions of this kind must not produce such somniferous conditions as to give Delilah the opportunity of cutting off the Samsonian locks. Energy must be met with energy; and such exercise of energy is merely for the protection and the development of interests, and is not an indication of the hoisting of the white flag.

A gas engineer and manager, whose father before him was in the profession, made the remark not long since: "We "have to do many things to-day with strenuous competitors "assailing that we should not have contemplated a few years "ago." And that is true; but every act that improves the reputation of gas is of advantage to the particular undertaking concerned, and to the industry generally. It is because of this that the Gaslight and Coke Company and other gas companies throughout the country are technically qualifying their outdoor staffs to be of greater use to the consumers, and more efficient in the performance of the work that comes to hand; it is because of this that the South Metropolitan Company have converted to fixtures, free of expense to the owners, thousands of water-slide chandeliers; it is because of this that the same Company before last winter season circularized their consumers using gas-fires—both hired and private possessions—emphasizing the need of periodical overhauling, and offering even to private owners to send a skilled man to examine the fires, clean the burners, and rearrange and replenish the fuel, quite free of cost; and it is because of this that many other companies the country through are rendering free services in various ways, in order

to maintain satisfaction and give the business a good name, and thus a stronger protection against competition. There is also an advertising value in judicious expenditure of this kind. All attentions to the consumer, of course, cost money; and so does lost business. But the expenditure is that of prudence. It brings the gas-supplying authority into touch with the consumers, and it creates an interest in the gas suppliers that never before obtained. The belief of Mr. Ulick J. Burke, the Chairman of the Brentford Gas Company, ought to be printed and hung in every Board room. It is to the effect that it is not good policy in these days to run a gas undertaking "on the cheap." If all gas directors and committeemen would only recognize this, more effectual support would be vouchsafed the gas managers in certain towns to keep the gas undertaking in good grace among the consumers and to develop the business.

This outdoor business is one that now, in all but the smallest towns, really requires an official, under the engineer and manager, who can specialize, concentrate attention, and make a constant study of the multiform work of which he has charge. In the address that Dr. Alex. C. Humphreys delivered to the American Commercial Gas Association at their annual meeting (which address, as those who read it have seen, is stocked with memorabilia for those who order the commercial policy of gas undertakings), a strong point is made of the necessity in these times of a specialized head for the commercial department, but not one to work independently of the engineer and manager. Specialized though the trading head may be, he must be one with capacity for observation, and with a field of vision extending beyond the boundary lines of his own official activity, and not the superior man who believes that his individual practices constitute the height of perfection in his particular field of labour. "We need," says the perceptive Dr. Humphreys, "to secure the "fullest service from those trained to the highest possible "degree for efficient commercial management." Times have changed, and with them requirement; and it is better to hyperbolize the fact than to mistakenly treat it with an insufficient regard. Such a departmental man will—as such officials do where already engaged—find much to occupy him. He will have charge of the maintenance and development of sales, he will have to look after the needs of present and possible consumers, must carefully study the means to be adopted to meet their wants so far as is consistent with the legitimate interests of the sellers, must keep constantly in mind the problem of enlarging the field of usefulness and the range of appliances, and must discreetly labour to keep in check and to checkmate competitors. His attitude towards all with whom he comes in contact must be that of one who has a personal interest in maintaining or bringing about business relations. He must show an independence in his choice of the most efficient appliances for recommendation—courting no man's favour, and fearing none; and above all things, he must keep himself up-to-date.

Growth of Coin-Meter Robberies.

PREPAYMENT meter robberies are extending in a serious manner; and this points to two things—first that the punishment hitherto meted out to those committing the crime is inadequate, and, secondly, that knowledge of the ease with which meter cash-boxes can be ripped open, and hard cash be obtained, is spreading. So much so has the coin meter presented a means for plunder without much trouble that men, so it transpired at Birmingham recently, have adopted meter pilfering as a business. Birmingham is only one instance of widespread robbery, which seems to have become universal, and in places in a manner that is somewhat appalling. Prominence has been given, within the last week or two, to two other instances. In the half-yearly accounts of the South Metropolitan Company was this striking item: "Stolen from 4143 slot meters broken open, £465 2s. 5d." The gravity of the statement lies as much in the number of robberies and in the number of meters damaged as in the sum of money actually and criminally appropriated. At the half-yearly meeting of the Tottenham and Edmonton Company, Mr. Corbet Woodall, remarking on the growth in the number of prepayment meter users, also pointed out that the number of thefts from the cash-boxes was growing disproportionately. In 1906 there were 362 robberies, and in 1907 774—in other words, the number more than doubled in the year. These increasing robberies involve much time, worry, and expense. They call for increased vigilance on the part of the police, they occupy time at the Police Courts when fortunately the thieves are caught, occasion anxiety to the outdoor staffs of the gas undertakings, put the poor users of slot-meters in suspense as to their obligations (the respective liability of consumer and supplier has not yet been clearly defined) when their houses are broken into and the money that has been placed with all confidence in the meter is stolen, gas consumption is temporarily stopped, and a heavy expense is caused in repairing the damaged money-boxes. It must have cost a considerable amount to repair the 4143 violently ruptured meters in the case of the South Metropolitan Gas Company.

Police and punishment, the growing crime bears witness, are ineffectual in suppressing it. Something must be done; but it would be unfair of gas suppliers, having introduced a system which has furnished so much opportunity for the thief, to lightly divest themselves of all responsibility by the thought that crime is a matter solely for the police. Various are the suggestions that have been made by which gas suppliers might mitigate the evil. There is no excuse for fixing these meters in places readily accessible to these depredators; and those who expose slot meters in this way with inadequate protection deserve to lose money and incur trouble. The suggestion has been made that the money should be collected at more frequent intervals, so that the amount found in the money-boxes should be so small that thieves would be discouraged in running the risk of losing their liberty for the little gain. But more frequent collections would, of course, cost considerably more money; and there are many slot-meter users whose patronage already does not yield sufficient to compensate the suppliers of the gas for their expense and trouble. Moreover, the gas supplier has no desire to make himself a nuisance to the prepayment meter user by too frequent visits. The best suggestion is undoubtedly the adoption of stronger money-boxes. Where they are being put in for new installations and when meters are disconnected for repair, in those districts the robberies are on the decline. Where there is complete freedom from such robberies is where the "stop" meter is in use; and Croydon, as Mr. Charles Hussey's speech at the meeting of the proprietors on Friday showed, can present an unblemished record in this particular respect. The "stop" meter cannot displace the slot meter to-day; but the freedom from robberies and all the consequential trouble is a point in favour of the "stop" meter to which its adherents can refer with some amount of pride and gratification.

Price of Gas at Liverpool.

Among the places where dear coal has not entailed an extra charge for gas may be mentioned Liverpool. Not only this, but the Chairman (Mr. H. Wade Deacon) assured the consumers in the course of the recent half-yearly meeting that the Directors did not propose to make any increase during the next six months. Accounts are not presented by the Company at this time of the year; but the Chairman admitted that though there had been a large increase of expenditure in the item of coal, the results from the sales of residual products had been highly satisfactory. There is also reason for congratulation with regard to the consumption of gas, which has advanced by nearly 3 per cent.; the increase not having been confined to any particular class of consumers As to the effects of the competition of electricity, the "Liverpool Courier" says: "Ninety years have elapsed since the Company came into existence under the Act passed near the close of George the Third's reign; and despite competition, it holds on its way. It is able to supply good gas at very moderate price, and to give its proprietary a substantial profit on their investments."

Coal at Newcastle.

In addition to high price, the Newcastle and Gateshead Gas Company have experienced another difficulty arising out of the boom in the coal trade—namely, short deliveries. The contractors found out that they were able to obtain more for their produce than the Company felt themselves in a position to pay, with the consequence that the coal was diverted into other channels, and the Company had to take their chance. Apart from this fact, and the anxiety felt during the time when the railway strike was threatened, the past year was an extremely satisfactory one at Newcastle. At the meeting, the Chairman (Sir W. H. Stephenson) pointed out that the gross revenue of £418,258 was the largest the Company had ever received; while,

on the other hand, the expenditure was about £11,000 less than in 1901—the year of the previous coal boom. Coal cost over £32,000 more than in the preceding twelve months; and, in addition to this, as from July 1 a substantial concession has been made to users of gas for power purposes, by an increase of the discount to 25 per cent. for prompt payment. Of course, the better prices realized for coke went a long way towards off-setting the extra outlay on coal; and to this, and the fact that there were substantial balances of coal to receive under previous contracts at lower prices than those prevailing last year, is attributable the ability of the Company to get along without making any increase in the price of gas. The proprietors, under all the circumstances, will be hardly likely to dispute the Chairman's claim that the result of the past year's working is very satisfactory indeed.

Record Outputs at Croydon.

The Croydon Gas Company, the interesting address of Mr. Charles Hussey to the proprietors last Friday informs us, have lately been establishing records in gas outputs, notwithstanding municipal competition with electricity. One day last month as much as 5,737,000 cubic feet of gas was sent out. That is the Company's top figure for twenty-four hours. On a Sunday last month, too, there was, in contrast with the corresponding Sunday of last year, an accession of consumption to the extent of 37·4 per cent. These big outputs were registered during cold and inclement weather; and as Mr. Hussey truly says, they point to two things—the application of gas as a source of warmth, and the increasingly violent fluctuations of demand for which provision has to be made. At Croydon, as an illustrated article in the "JOURNAL" not long since showed, the Engineer and General Manager (Mr. J. W. Helps) has been enlarging the Company's works, and is now engaged in modernizing the old section; and, when this is done, much bigger fluctuations may come, and will find they have been well prepared for. The Company are, the accounts show, deriving good economies from their large expenditure on modern plant; and this will be progressive as work settles down to greater regularity than can be obtained while the works are somewhat disordered by the construction in progress. The report made at the meeting evidences the progressive character of the gas business in Croydon and surrounding districts.

Progress at Chester.

At the meeting of the Chester Gas Company, the unfortunate illness of the Chairman (Mr. John Gamon), led the Deputy-Chairman (Mr. J. G. Frost), who presided, to make some comparisons between the position of the Company now and that which it occupied at the time when Mr. Gamon became Chairman. In the period of twelve years or so that has elapsed, the consumption has grown from 166¾ million cubic feet to 230½ millions; while the average price has been reduced 4d. per 1000 cubic feet, and meter-rents have been discontinued. Meanwhile, electricity has been introduced into Chester; and the supply of gas for public lighting has been reduced from 17½ million feet to about 2⅛ millions. This fact renders the increase in the total consumption particularly satisfactory. Since the introduction of electricity the quantity of gas used by private consumers has grown by no less than 33⅓ per cent.; while, after allowing for the decrease on the public lighting account, the increase over the total supply has amounted to 22½ per cent. These figures furnish most convincing testimony to the ability of gas to more than hold its own against electricity.

Growth of Consumption at Ipswich.

A record output of gas was reported at the annual meeting of the Ipswich Gas Company last week by the Chairman (Sir Daniel F. Goddard, M.P.). This was, however, not the only gratifying feature; for he remarked that, as the result of keeping up to the mark, they had got in the year under review better plant, which was working in a better way; they had had a better yield of residuals; and, though they had had to face a very serious increase in the cost of coal, they had earned their full dividends. As a matter of fact, though the increase in the cost of coal amounted to something like 1¼d. upon every 1000 cubic feet of gas sold, there had been a rise in the price of residuals which left the net additional cost of coal at ¾d. per 1000 cubic feet of gas. Everything, said the Chairman, is going on exceedingly well; and the Company have so able a staff that they feel they can keep up to date in every department. This is a cheerful state of mind, and it is fully justified—even though the Company may be face to face with continuous competition of a municipal electric light supply. In the twenty years or so during which Mr. J. T. Jolliffe has been Manager, the number of consumers has risen from under 4000 to nearly 14,500—no less than 700 new ones having come on during the past year. Naturally, the Chairman made some reference to the success of the Company in their recent rating appeal, and said the Directors hoped—"though it was a too sanguine hope, perhaps—that the question had now been settled for good and all." The Board of the Ipswich Gas Company are not alone in this feeling.

Physical Incapacity and Retention of Directorships.

It can never be without regret that the shareholders of a Company can part with a member of the Board who, after long and excellent service, can no longer, through the infirmities of age, attend Board and shareholders' meetings, and take his part in the responsibilities and work of the office. It was a somewhat painful incident in the proceedings of the South Suburban Gas Company on Friday, when, justice to the shareholders and duty to themselves, compelled the remaining members of the Board to announce, through their Chairman (Sir George Livesey), that though Mr. Lea Wilson had offered himself for re-election, they could not submit a resolution to that effect or support him in any way. Enfeebled by age, it is about four years since Mr. Wilson attended a meeting of the proprietors, and more than eighteen months since he could aid the Board by his counsel and take part in the ordinary directorial duties. Apart altogether from the question of receiving emoluments without discharging any duty whatever, a large trading undertaking such as this of the South Suburban Gas Company must have in its management a complete and capable working Board. The business requires it, the shareholders (lenient though they have been) expect it, and every individual member of the Board has a right to the responsibilities of direction being shouldered not by part, but by the full number of Directors elected. Though there was sorrow at the physical incapacity of Mr. Lea Wilson, duty and not sentiment prevailed at the meeting of the proprietors on Friday; and there was no motion with regard to maintaining Mr. Wilson's name in the list of Directors. There is a vacancy now to be filled.

A Novel Complaint—Too Much Light.

Generally the demand is for more and more light, and the complaint is (or was) that there is not enough of it. If we were to transport ourselves back but a few years before the advent of the cheap incandescent gas-burner—or, it would seem, if we were merely to enter to-day into an electrically-lighted home at West Ham—we should be astonished at the paucity of light. In Venice, while they are building new gas-works there, they are also changing the old flat-flame burners for the modern incandescent gas-mantles. We learn from our Italian contemporary "Il Gaz" that this change has given rise to an outburst of complaint on the part of some; the reason being that there is now too much light! A circular of protest has been issued which says: "The proper feeling of discontent among the inhabitants at the present poorness of the gas lighting has led the Municipality of Venice to adopt the incandescent mantle along the Grand Canal, smaller canals, and streets. We ask intelligent citizens to sign this protest against such a scandal. The misleading and dazzling light of the Auer burners will destroy the moonlight and all the fascination of the Venetian night celebrated throughout the world for its enchanting beauty." So it comes to be a case of Mantle *v.* Moon! The incandescent gas-burners give too brilliant a light for the soft and silvery moonbeams to have full play over the waters of Venetian canals. Poor moon, can she really be put out by the gas-mantle? We very much doubt it; and from our own recollections of Venetia's waterways, a little more light would have enabled us to see beauties that were hidden in the shade. We are all for the "harmonic lighting effects" and "sacred beauty" of Venice; but we really cannot believe that either will be ruined, or even interfered with, by the economical and effective distribution of light from modern gas-burners. There will always be some "artists" and "aristocratic dames," such as those who have put their signatures to this quaint protest, who wish to preserve the world for their own one-eyed visions.

GAS STOCK AND SHARE MARKET.

(For Stock and Share List, see p. 506.)

THINGS on the Stock Exchange last week did not on the whole march quite satisfactorily. Business was quiet and disappointing. Adverse factors cropped up in the form of fresh labour disputes, and a possible recrudescence of the near Eastern question in Macedonia. However, the week was not uniformly gloomy throughout. On Monday the opening was poor, and prices were lower all round, though not at their worst at the finish. On Tuesday some departments cheered up a bit. Consols marked a slight advance, and Americans steadied; but Home Rails were very poor. Wednesday's movements were irregular, according as special factors pointed; the gilt-edged division having the best of it. Much the same conditions prevailed on Thursday; but Home Rails still displayed weakness. Friday was better, and free from the amount of realizing which so often sets things back on a Friday. On Saturday there was some little dulness in most markets; but the gilt-edged class still kept good. Indeed, the prospects of easier monetary conditions at no distant date had served them well throughout the week, and the closing price of Consols showed an excellent advance upon the opening figures. In the Money Market, the tendency was easy at first; but it hardened later in response to a strong demand for short loans, and discount rates became firmer. Business in the Gas Market was on the whole somewhat lighter than the week before, and there were fewer movements in value. The ruling tendency was still favourable, and several quotations improved. In Gaslight and Coke issues, the ordinary was not so active as of late, and on one or two days it was very still. Transactions marked ranged from 97 to 98¼—being just a fraction easier. In the secured issues, the preference scored an advance, with dealings at from 106 to 108; the maximum was done at 87 and 88; and the debenture at 83¼. South Metropolitan was more active and a fraction up. Business was done at from 121 special to 122½; and in the debenture at from 83 to 84¼. In Commercials, the 4 per cent. advanced a point, with transactions at 107 and 109. The 3½ per cent. marked 102; and the debenture 82½ and 83. In the Suburban and Provincial group, Alliance and Dublin new changed hands at 14½, British at 42⅝, Brentford old at 249, Lea Bridge at 115¼ and 115½, South Suburban at 120½, Tottenham "B" at 104½, West Ham at 105¼ and 105½, and ditto debenture at 106 and 106¼. The Continental Companies were quiet. Imperial receded a point, with transactions at from 181¾ to 180. Union gained two, and marked 117½; and European fully-paid rose ½, with business done at 23½. Tuscan marked 10⅜. Among the undertakings of the remoter world, Bombay changed hands at 6 5/16 and 6½, Buenos Ayres at 11¾, Monte Video at 11, Primitiva at 6⅞ and 6¾, ditto preference at from 4⅝ to 5 1/16, ditto debenture at 94½, River Plate at from 13⅝ to 13⅞, and San Paulo at 13⅜ and 13½.

ELECTRICITY SUPPLY MEMORANDA.

Some of the Effects of the Metallic Filaments—Hopes and Fears—Lamps for the Higher Voltages—The Welsbach Challenge Again—Its Alleged "Absurdity" and Contained "Imaginary Statements"—Good Reasons for its Acceptance—Wiring New Houses—Electricity Committees and Public Lighting.

OPTIMISM and pessimism have indiscriminately taken hold of central station engineers in connection with the metallic filament lamps. Some look upon them as the greatest blessing that has ever been devised for helping them over that awkward stile of cost with their consumers who have learned of the economy of incandescent gas lighting, and, moreover, the increased economy of the new forms of burners. Others look with fear to the depletion of the revenue from the lighting business (more especially when the metallic filament arrives that will not give up the ghost on a 200 to 250 volt service), upon which business they depend to yield them some net profit and to make amends for those of their power and heating customers who are non-paying, and business with whom it would be better to forfeit if the suppliers only dared. A very fair presentment of the two sides of the question has appeared in three articles lately published in the "Electrical Times;" but the writer is one of the optimists who cannot put himself sufficiently under restraint, even when treating of the lugubrious side of his subject, without exposing his ebullient feelings. Of course, there are many central station engineers who fully believe (but we have our doubts) that the metallic filaments will in time almost completely oust the carbon filaments; and not only so, but that the new lamps are going to work marvels in enabling the electricity supply authorities to regain consumers won over by gas, and in this way there will be an appreciable diminution of the number of points of wiring now out of use, with big additions to new points. But we would suggest that running cost is not the only consideration that has turned numerous electricity consumers to the older lighting agent—and electricians realize the difficulty. In those towns, too, where the price of gas is fairly dear, the electricity supply authorities are said to be looking forward with confidence to making, by the aid of the metallic filament lamps, some considerable inroads into the gas revenue. There, again, in residential districts where gas is fairly dear, electricity (there being practically no other sources of revenue than lighting) is also dear; and, as a general rule, it will be found that the Osram and similar lamps where they can be used in single units (and there are not many such places) are, in their running cost, about twice as expensive as incandescent gas lighting, without having regard to the heavy expense of wiring, and installation and renewal of lamps. This question of wiring and installation, in the campaign for new business, is a sore point with electricity engineers; and while they recognize that there will be a general reduction of existing revenue through the new lamps, they also have present in mind that, to get the imperatively necessary compensation business, they must face a heavy capital expenditure on services and meters (on which expenditure sinking fund, in the case of municipalities, and interest must be provided), and this for consumers whose contribution to revenue will be less than that of consumers under the old order of things. But the engineers console themselves that the charges on this expenditure will be ("generally" the writer of the articles says, we prefer to say, in part) covered by meter-rents. If meter-rents are made a too comprehensive charge, they will assist in frightening householders.

However, central station engineers are commanded to be of good cheer; for new consumers and the growing desire for more light must (it is thought there is no help for it) bring unknown compensations. In the first place, what amount of business is it that the undertakings will have to make up? The "Electrical Times" writer says: "With 50 per cent. of metallic filaments, an undertaking will require to do at least 50 per cent. additional volume of new business, for 40 per cent. increase in actual lamp-hours is necessary to maintain the present revenues." That is a substantial loss to overtake from the smaller class of consumers who will have to be attacked, and whose consumption of electricity would—if the metallic filaments come along that can be employed singly on high-voltage systems—be lower than if they were using carbon filament lamps. With regard to the desire for more light rendering aid, we are not surprised to see, in an electrical paper, the tardy admission as to the existence of such a desire. It has been known long enough, but rarely admitted, by electricians, who, too, have been loth to confess that the sparing use of electric light has been due to cost. But this is what is now said: "Owing to the present cost of electric light, sparing use is made of the supply, and lights are turned out except where absolutely necessary. The admitted advantages of electric light are for many people offset *by the need of keeping the premises in semi-darkness.* [*Vide* the West Ham prescription for house lighting published in our "Correspondence" columns on Feb. 11.] That is to say, no lights are kept burning in corridors and bedrooms, resulting in a less cheerful effect than that obtained with every window aglow. When once they have learned to economize, people are *fairly well* satisfied with their bills. But they want more light—always more light." And what is more the consumer "feels the greater comfort of the better light." Our electrical friends hope this may all work out as they wish. But getting new consumers, and encouraging the present consumers to use more light is work that will take time; and some station engineers are congratulating themselves that the high price of the lamps will cause the change from the carbon filaments to the metallic filaments to jog along slowly. What they do not like is the big hotels, clubs, places of entertainment, and such like going in, without reserve, for the new lamps, solely for the sake of economy. It is in such places where considerable use is made of electricity in cluster lighting for large rooms that the lamps will undoubtedly effect an appreciable economy, and cause the revenue of the undertaking to feel (as "Meteor" would say) a draught. But the great thing that is advocated for central stations is to get liberal wiring powers, seeing that wiring is "inextricably woven into the problem of metallic filament lamps, and either ties or strengthens one's hands in the struggle with competing gas." The question of tariffs is also discussed in the articles. The high efficiency of the metallic filament lamps, it is thought, has postponed the necessity for considering reductions; but it is believed that, to get down to the poorer strata of consumers, it will be necessary to simplify charges as much as possible. The writer of the articles remarks: "The householder who pays nothing for his gas-pipes is astonished when he changes over from gas to electricity, to find that he has entered into a highly complex agreement." That is true; and equally true is it that central station engineers are finding their position also daily growing more complex.

Metallic filament lamps that can be used singly on the higher voltages are, it is announced, quite near at hand; and they will cause more fear and trembling. It is stated that in Berlin 40 and 50 candle power Osram lamps are being made for 220 volts; but they cannot be manufactured so quickly as the type now in use. Therefore it may be expected that they will be dearer. The Bryant Trading Syndicate also proclaim that, by the end of March, if expectations are realized, they will have on the market metallic filament lamps of from 17-candle power at 100 volts to 35-candle power at 250 volts—all at 1¼ watts per candle. An 8-candle lamp is also to be produced to run on 100-volt circuits, with a consumption of 1¾ watts per candle.

It must afford the Welsbach Incandescent Gaslight Company an infinite amount of amusement to see the reception by the electricians of their challenge to put to direct and conclusive proof the repeated statements that "electricity is cheaper than gas," and that the Osram lamp has brought electricity down in cost for illuminating purposes to a lower level than gas. After blowing

their trumpets over the remarkable cheapness of electricity, the refusal to accept the challenge of the Welsbach Company shows a pusillanimous spirit. Judging from the notices that meet the eye week after week in the electrical papers, no man knows better how to advertise the doings of the West Ham Electricity Department than Mr. A. Hugh Seabrook, the Electrical Engineer, and in connection with the notices his name is, of course, quite incidentally mentioned. It is not only in the electrical press that the advertisements of the West Ham Electricity Department appear. On coal bunkers at West Ham runs the legend "Electricity is cheaper than gas," and in the leaflets of the department the same statement appears. There is no lack of assertion at West Ham; but proof! where is it? At West Ham, hypothetical statement and flourish is good enough, so thinks Mr. Seabrook; and when the Welsbach challenge found its way into the local press, Mr. Seabrook promptly made use of both these feeble weapons, in a letter in the "Stratford Express," for the purpose of taking the edge off the Welsbach challenge. Mr. Seabrook manifestly regards the residents of West Ham as a lot of numskulls, or he would never have written the letter in question. He says that the challenge "on the face of it, is an absurd one, and quite impossible of acceptance." The logicians of West Ham will say that, if the challenge is an absurd one, it ought to be quite possible for Mr. Seabrook to offer to accept it (seeing that the General Electric Company continue to cry off) after the noise he has been making about "electricity being cheaper than gas." Of course, as Mr. Seabrook is careful not to explain why the challenge on the face of it is absurd, and why it is quite impossible of acceptance, it will be open for the people of West Ham to construe his statements as meaning that the impossibility of acceptance is due to the absurd position in which, in the result, electricity would find itself.

Mr. Seabrook unintentionally goes on to give further reasons why the acceptance of the challenge would be the easiest thing in the world. His object in writing his letter to the local paper is to prevent the residents of West Ham "from swallowing such an absurd statement as that the lighting bill in a house fitted up with these advertised mantles will cost ["amount to" would have been better] only half of what it does in a precisely similar house where Osram electric lamps are installed"—and it should be added in which an equal amount of illumination is obtained. What a fine advertisement the West Ham Electricity Department and again incidentally Mr. Seabrook are missing by not giving the deathblow to this "absurd challenge," and to the "imaginary statements." The statements, by the way, are not imaginary; they are very real statements, and quite capable of substantiation. Mr. Seabrook goes on to refer to tests made by the Westminster Testing Laboratory of a Block gas-burner with an Osram electric lamp. Pity he forgot to mention that the Westminster Testing Laboratory is an electrical institution, where some time ago we found there existed queer notions as to how to fairly test incandescent gas-burners. Moreover, the challenging Welsbach Company may not admit that, whatever may be the claims made for it, the Block light is the superior of their own. Then there is a hypothetical calculation by Mr. Seabrook showing the cost of lighting a house for six years by twenty incandescent gas-lights and by twenty Osram lamps (nothing is said as to illuminating power, hours of use, number of lights allowed simultaneously in the house, &c.); and in both cases Mr. Seabrook makes out that the cost in six years would be £15; but in the period the gas-lighted house would have to be redecorated twice at a cost of £15, and the electricity-lighted house only once at a cost of £7 10s. What a filthy and faded state that electricity-lighted house would be in—inhabited, in daily use, and in the refined atmosphere of West Ham—at the end of the six years! May we ever be kept from the acceptance of the doctrines of such unsanitary electrical engineers. A better letter than Mr. Seabrook's showing cause for the acceptance of the Welsbach challenge could not have been penned—the absurdity (his whole argument shows) consists in the refusal to offer to take it up. Next excuse, please.

It is not for a moment supposed that the officials of gas undertakings are not keenly alive to the necessity of looking well after the piping of new property in their areas of supply; but it is well to keep in view the fact that some electrical engineers are as keenly alive to this matter as gas engineers. It was mentioned at a Local Government Board inquiry into a loan for the extension of the Fulham electricity works that the number of new houses in the district had of late varied between 400 and 600 a year, "most of which were wired during erection for the electric light." There must be a fair amount of dead-capital in electric lighting wires in Fulham. The undertaking, we believe, is in its sixth year of working; and it has a habit of keeping to a few hundreds in the matter of "net" profit. Now that a further loan of £22,000 is being applied for, perhaps it will not be able to do that. The undertaking has a bad record for fires, which the Clerk describes as having been "serious." One occurred in the boiler-house; the other in the offices.

Kingston-on-Thames ought to follow the example of Tunbridge Wells; and transfer all public lighting questions to a Committee independent of the electricity undertaking. The concern has not been a phenomenal success; and evidently the Committee are proposing to give the results a little more polish by way of the public lighting. In a proposed application for a loan of £12,600 for various purposes of the undertaking are included amounts of £300 for arc lighting and £1232 for incandescent electric lighting. The spirit in which the Committee are looking after the public lighting and regarding the Gas Company is well portrayed in the words of the Chairman of the Lighting Committee (Mr. Sprunt) that "they had had a good deal to do with the Gas Company lately, and the sooner they got the whole of the public lighting into their own hands, the better it would be for the town." That is a personal opinion that the cost per mile of the respective forms of lighting does not bear out. As the application for a loan includes the above items for public lighting, perhaps the Local Government Board Inspector will ascertain what the Chairman meant by his statement, and also whether there is any preferential treatment being meted out to the electricity undertaking to the financial detriment of the ratepayers. The return from which some statistics were published last week. indicates that the possession of an electricity undertaking leads to a great squandering of money by local authorities on street lighting; while where companies are supplying the electricity, the local authorities do not find occasion to patronize electricity for public lighting, though, for the purpose, the average charge per unit by the companies included in the return is lower than that of the local authorities.

HIGH-PRESSURE GAS FOR FACTORIES.

A Test at Aylesbury.

We have received from Mr. George Lane, Assoc.M.Inst.C.E., the Engineer and Manager of the Aylesbury Gas Company, the results of a test of the high-pressure gas-lighting plant in the printing establishment of Messrs. Hazell, Watson, and Viney, Limited, under ordinary working conditions. The test was made on the 13th inst., by Mr. Lane's Assistant, Mr. F. J. Robinson; and at the time it was carried out the lamps generally were giving their maximum amount of light, as the pressure was slightly above what was required to get full efficiency. In sending the particulars (for which we must express our thanks to Mr. Lane), he said he thought they would be interesting to readers of the "Journal," affording as they do "ample evidence of the great superiority of gas lighting for factories, workshops, &c., over electricity manufactured privately and at the point of consumption." The following are Mr. Robinson's figures:—

Test.	Time. Min.	Sec.	Gas Consumed. Cubic Feet.	Rate per Hour. Cubic Feet.
No. 1	3	50	40	625
,, 2	3	52	40	621
,, 3	3	53	40	618
,, 4	3	51	40	623
Average	3	51	40	623

This gas was expended in lighting the following lamps:—

47 of 300-candle power	14,100 candle power
9 ,, 150 ,, ,,	1,350 ,, ,,
28 ,, 75 ,, ,,	2,100 ,, ,,
Making a total of	17,550 candle power

Or 28·17 candles per cubic foot of gas.

In the course of his report to the firm, Mr. Lane said: "This light at your present price of gas (2s. 10d. per 1000 cubic feet) costs 21·18d. per hour; or a light of 1000 candles is obtained for 1·21d. per hour. The osram electric lamp, which is the most economical on the market, has an efficiency of from 1 to 1¼ watts per candle. This means that a Board of Trade unit will maintain a light of 32-candle power for nearly 28½ hours. Assuming your manufacturing price to be 2d. per unit, electricity will give 28½ hours of a 32-candle power lamp for 2d.; so that 32-candle power for one hour would cost 2d. ÷ 28½, or—

$$\frac{2}{1} \times \frac{2}{57} = 4\text{-}57\text{ths of a penny.}$$

1000-candle power would therefore cost for one hour—

$$\frac{4}{57} \times \frac{1000}{1} \times \frac{1}{32} = 2\text{·}19\text{d.}$$

Therefore this shows that—

Gas costs	1·21d. per 1000 candles per hour.
Electricity costs	2·19 ,, ,, ,, ,, ,,
Saving by gas	0·98d. ,, ,, ,, ,, ,,

And that the 17,550-candle power evolved during the test, and costing 1s. 9·18d. per hour by gas, would cost by electricity 3s. 2·43d., or 1s. 5¼d. more."

Mr. Lane added: "The total cost of the whole of the lighting by this method during the past year was only £41 10s. 3d., or 2s. 8d. per working day. The renewal of the osram lamp is also another item to be considered in working costs, as I find its average life is from 400 to 500 hours, and would, therefore, have to be replaced twice a year, while by your compressed gas system the burner would last at least five years and the mantle six months—in fact, your Engineer reports that some have not been changed since they were put on in November, 1906. These facts, I think, are ample proof of the great advantage of high-pressure gas lighting over any other illuminant, and are evidence that you have a system which is far superior to electricity."

WILLIAM JOHN WARNER.

We much regret to have to record the severance of one of the few remaining links connecting the present with the past of the gas industry of this country. By the death, on Monday last week, at his residence "Larchfield," Barkston Ash, near Tadcaster, of Mr. William John Warner, the group of gas engineers and managers whose duties lie in the towns in the North of England have lost a colleague who for nearly forty years occupied an important position in their district, and who was always ready to join them in their professional deliberations as well as in the social gatherings by which they were accompanied.

Mr. Warner was born in John Street, Adelphi, London, on April 19, 1829—Easter Day; and had he lived over the next festival, he would have entered on his eightieth year. He was educated privately, and always evinced a taste for mechanics. When quite a young man, he commenced business as a gas-meter manufacturer near the Gray's Inn Road. The undertaking was, however, unsuccessful; and it was given up. He then obtained the position of Inspector to the Bath Gas Company. Meanwhile, he invented a dry gas-meter which was manufactured by Mr. Thomas Edge. While in the service of the Company, he not only gave satisfaction to the Directors but gained the esteem of those with whom he was associated; for our columns record that on April 16, 1860—very near the thirty-first anniversary of his birthday—he was the recipient of a testimonial, in the shape of a silver cup, from the men under his supervision, "as a mark of respect." The presentation was made in the presence of the Chairman of the Company, as well as of the Secretary (Mr. George Helps). A few years later (on Jan. 5, 1864), he was appointed Engineer of the South Shields Gas Company, and held the position till his resignation in October, 1900.

Mr. Warner had not been long with the Company before he recognized the necessity for improvements in the plant; and at the half-yearly meeting in September, 1864, he presented a report on the condition of the works. These were then evidently undergoing modification; for early in December of the following year, our columns contained a paragraph to the effect that "the works had been entirely reconstructed, and ranked among the most efficient in the North of England." In 1867 the Company applied to Parliament for more capital; and in the forty years which have since elapsed they have made remarkable progress. Last year they had the largest sale of gas on record—viz., 452¾ million cubic feet; while the percentage increase over the preceding year was the highest attained for ten years, being 6¼ per cent.

It was in 1863 that the British Association of Gas Managers was formed; and Mr. Warner was one of the earliest members, having been elected in 1866. In thirteen years he rose to the highest position; being President in 1879. He never severed his connection with the organization, but passed successively into the Gas Institute and the present Institution of Gas Engineers. To its proceedings he was by no means an infrequent contributor, as will be seen from the following list of papers:—

1867.—Valves of Purifiers.
1870.—Gas-Meters.
1871.—Best Form of Carbonizing Accounts.
1872.—Governors and the Governor-Room.
1873.—The Distribution of Gas, and the Importance of Having a Complete and Perfect Register of Distributing Plant.
1874.—The Wet Meter.
1876.—Various Methods of Jointing Mains with a View to the Reduction of Leakage.
1877.—Periodical District Pressure-Taking.
1881.—The Incidence of Commercial Charges in the Selling Prices of Gas.
1887.—Gas Legislation.
1891.—The Diaphragm or Measuring Chamber of Dry Gas-Meters.

Apart from these technical contributions, Mr. Warner did good service to the Association by bringing under the notice of the members the subject of a Benevolent Fund. At the meeting in London in 1870, he moved—"That a gas managers' benefit fund be formed for the relief of deserving members who may be incapacitated by old age or sickness from discharging their duties." He pointed out that the subject had frequently been brought under the attention of gas managers, not only at the annual meetings of the Association, but in the pages of the "Journal;" and he said they, as a body, were behind their subordinates in the creation of a benefit fund. The motion was seconded by Mr. (now Sir) George Livesey; and a Committee was appointed to consider the subject, and report thereon at the next meeting. The Committee's inquiries revealed to them the fact that only forty out of upwards of 300 members were distinctly in favour of the establishment of a benevolent fund, and that not a single member appeared to know of a case in which help from such a fund was needed. They were therefore unanimously of opinion, "much to the regret of several of them," that it would not be advisable to recommend to the Association the formation of a fund. One was formed, however, at the meeting of the Association in London, under the presidency of Mr. Robert Morton, in 1876; and Mr. Warner was one of the original Trustees.

In the spring of 1877, at Mr. Warner's suggestion, an exhibition of gas appliances was held in South Shields; and it necessarily brought together a number of the gas managers in the district. Before returning to their various towns, they held a meeting in the Board-Room of the South Shields Gas Company, and decided to form the North of England Gas Managers' Association. Mr. Warner was unanimously chosen as the first President, and Mr. Joseph Hepworth as the Vice-President. The first meeting was held the following October, when Mr. Warner delivered his Inaugural Address. In the course of it, referring to the formation of District Associations, he said:

> For a time I was jealous of District Associations; I was fearful that they would prejudice the position of the British Association—that they would have a tendency to weaken it, and so lower its tone rather than elevate its character. But, upon closer examination of the subject, I must admit I hold the opposite opinion. I believe District Associations will strengthen rather than weaken it; and that if these are not as large, there are as important spheres of usefulness for them as for the British Association, and that they will act and react upon each other, elevating the character of the working members, and raising the professional tone of their more fortunate, if not more gifted, brethren. One is the complement of the other.

Mr. Warner always took a lively interest in the work of the Association. At the spring meeting in 1880, he gave a description of the new stoking machinery invented by him, and installed at the new works of his Company at Jarrow, which the members were afforded an opportunity of inspecting. The machinery was illustrated in the "Journal" at the time. His other contributions to the proceedings were the following:—

1880.—Notes on the Work of the Purifier.
1884.—Experiences in Altering the Position of Gas-Mains.
1890.—Notes on Distributory Plant.
1892.—Notes upon the Action of the Sliding-Scale.

Mr. Warner was not a man to be satisfied with plant and appliances as he found them. He endeavoured to effect improvements in them. Consequently, during the period of his greatest activity, his name figured not infrequently in our "Register of Patents." Apart from the dry meter already referred to, one of his earliest attempts was in the direction of improving the arrangement of gas-retorts and the apparatus and machinery for charging and discharging them; and these matters were the subject of a patent taken out early in 1874. Shortly afterwards he obtained a patent for improvements in wet gas-meters; and in May he applied, in conjunction with Mr. William Cowan, for protection for a further improvement. It consisted in the construction of the wheel or drum with an inner wheel of slightly larger diameter than the dead portion of the wheel, within which the fluctuations in capacity of the combined wheels might take place. In this way it was claimed that "perfect accuracy is practically attained with reasonable variation in the water-line and an increased range of float." The results of the efforts of these two workers are to be found the world over. Next year, Mr. Warner turned his attention again to the manufacturing department, and took out a further patent for improvements in machinery and apparatus for charging and discharging retorts. In 1876, he patented arrangements for connecting mains and pipes, and indicating escapes of gas and water; and in the two succeeding years he sought protection for further improvements in retort-house machinery. The specification of the patent of 1878 was a very full one, and accompanied by several drawings. Mr. Warner was not again in the Patent Office for ten years; and his re-appearance was in connection with some further improvements in dry gas-meters. After another and rather shorter interval, he took out, in 1894, further patents, in conjunction with Mr. Cowan, for improvements in their patent of 1874; and these were his final applications.

In 1872, Mr. Warner wrote a small pamphlet on the uses of gas coke in domestic economy; and his efforts to stimulate the use of gas for cooking purposes were acknowledged by the late Mr. W. H. Bennett, the Secretary of the British Association of Gas Managers, who, in a paper on "Some of the Causes Tending to Restrict the Use of Gas and Coke, and How their Consumption may be Increased," read at the meeting of the Association in 1877, testified to the results achieved by the exhibition at South Shields to which reference has already been made. He said the Company had taken a step with regard to the cultivation of the public taste for gas cooking and heating which redounded greatly to their credit, and left a worthy example to be followed. In opening the discussion on the paper, Mr. Warner said he had long held that it was not only the duty of gas managers individually, but also collectively, to furnish instruction to gas consumers. His opinion was that, as an Association, they should not meet in any town without having some instructive public lecture given, for he was quite sure it would be attended with beneficial results. As a young man, Mr. Warner frequently delivered lectures on the subject of gas manufacture in Liverpool, Bath, and at the Polytechnic, London; being most enterprising in putting forward the utility of gas for lighting, heating, and cooking. In January, 1877, he was invited to read a paper on the wet meter before the Newcastle Association of Foremen Engineers and Draughtsmen; and in recognition of what he had done, the Association invited him to become an honorary life member. Of this he was very proud; for at that time there were very few who had been similarly honoured, among them being such men as Sir William (now Lord) Armstrong, Captain (now Sir Andrew) Noble, and Mr. William Black.

In private life, Mr. Warner's habits were most simple; but he was generous and hospitable, and unfailing in his courtesy to all who visited him in his home. He leaves a son and four daughters, for whom sympathy in their bereavement has been expressed by a large circle of friends. The funeral took place at the Parish Church, Sherburn-in-Elmet, last Thursday; the service being conducted by Canon Savage, a former Vicar of South Shields.

PERSONAL.

A meeting of a very pleasant character took place at the Victoria Hotel, Leeds, last Friday evening. A smoking concert had been organized by the members of the Distribution Staff of the Corporation Gas Department, for the purpose of bidding a collective farewell to Mr. GEORGE CURTIS, the Assistant Superintendent, who is leaving Leeds at the end of the present month to take up his duties as Superintendent of the Distribution Department of the Nottingham Corporation. During the evening, a presentation of a silver tea and coffee service was made to Mr. Curtis, on behalf of the staff, by Mr. George Ratcliffe, Chairman of the Gas Committee, who referred in very eulogistic terms to the recipient, and stated that his old friends in Leeds would watch his further career with great interest, and anticipated a prosperous and successful future for him. Mr. Walter Hole, the Superintendent of the Distribution Department, also referred to the excellent relations which had existed between Mr. Curtis and the workmen, and assured him that he had the hearty goodwill and the best wishes of all in the department for his future success. A capital programme of songs was rendered by various members of the staff and visitors.

GAS LIGHTING AT EARL'S COURT.

A RAPID transformation in the principal part of the lighting has been witnessed lately in those portions of the buildings at Earl's Court which have been requisitioned for the purposes of exhibitions of a strictly class character. No more than two or three weeks ago, there was held a Dress Exhibition, the large-unit lighting of which was carried out by means of electric arc lamps; and now these same lamps are seen hanging disconsolate and out of use, their place having been taken by a very fine installation of Sale-Onslow high-pressure gas-lights. This change has been carried out in connection with a Furniture Trades Exhibition, at present being held, and it has been a "quick change" in the most literal sense; there having been very few days' interval between the dismantling of the Dress Exhibition and the re-opening of the buildings for the furniture display. However, the Gaslight and Coke Company were able to get everything into proper order by the appointed time, in spite of the somewhat adverse conditions under which the work had to be carried out; and the result is a really first-class lighting effect. The exhibition is confined to the Queen's Palace, the Ducal Hall, and the annexe connecting the two buildings; and these are illuminated by 200 high-pressure Sale-Onslow lights, each having three burners of 500-candle power. The light given by each lamp is thus 1500 candles, making a total of 300,000-candle power for the 200 lights. The lamps in the annexe have to be run all day. In the case of the remaining ones, however, when shut down the bye-passes are on the low-pressure system. The pressure is 50 inches; and it is provided by means of a duplicate set of 4½ H.P. "National" gas-engines—one of which is kept as a stand-by in case of accident. Should there be any failure in the low-pressure supply for working the engines, arrangements have been made whereby the high-pressure gas can be utilized for running them while the defect is being remedied. Many of the stalls, it should be mentioned, are lighted effectively by Bland inverted gas-lamps; each stand being controlled by a separate cock. Altogether there are more than 200 of these Bland lights in use. Gas has also been requisitioned for the purpose of heating the exhibition; there being about ninety stoves of various makes employed. To the credit of these appliances it may be said that they efficiently meet the demands made upon them by the nature of the structures requiring to be heated.

Institution of Mechanical Engineers.—In the report presented at the annual meeting of the Institution last Friday, the Council stated that the total number on the roll at the close of last year was 5238, compared with 4979 at the end of 1906; being a gain of 259. The revenue for the year was £14,301, and the expenditure £11,341; leaving a balance of £2480, exclusive of entrance fees and life compositions, amounting together to £480. The Council mentioned that they had gratefully accepted from Mr. Charles Hawksley an offer of £1000, for the foundation of a scholarship or premium to commemorate the centenary of the birth of his father, Mr. Thomas Hawksley, a Past-President of the Institution. They also stated that the date for sending in papers for the Water Arbitration Prize competition, to which reference has already been made in the "JOURNAL," on the subject of the "Filtration and Purification of Water for Public Supply," has been postponed until the 3rd of July next. In accordance with the announcement made a year ago, Professor F. W. Burstall, the reporter to the Gas-Engine Research Committee, completed in October a series of experiments, extending over three years, upon the large gas-engine at the University of Birmingham. These experiments, which have been noticed in our columns, were carried out principally at full load on constant gas to air ratio, with scavenging and varying compressions. Some further experiments on the same lines are to be carried out with a water brake, and with both optical and string indicators.

STANDARDS OF ILLUMINATION.

A RECENT issue of the "Journal für Gasbeleuchtung" contains an article by Dr. Berthold Monasch, of Berlin, in which the author calls attention to the numerous units employed at the present time for recording the amount of illumination received upon any surface undergoing photometric examination, and also to the loose way in which names are given to these units.

Dr. Monasch begins his article by recalling the attempts made by different technical societies to ensure the adoption of an international standard of illuminating power. In spite of the numerous meetings held since the year 1881, it has proved impossible to oust the standard "candle" from British, the Hefner lamp from German, and the Carcel lamp from French laboratories; and therefore the International Committee on Photometry have found themselves compelled to accept the simultaneous existence of these three standards. All recent work, accordingly, has been limited to a precise evaluation of each standard in terms of the others—an investigation that may be said to have been brought to a successful issue as a result of the meeting held in Zürich last July. Thus three main units of illuminating power remain in current literature—viz., the Hefner, the "candle," and the carcel—though in France the "bougie" is also used, while in Great Britain the "candle" is either the average light yielded by a standard sperm candle or one-tenth of the light given by the Harcourt pentane lamp.

As a unit of illumination, the word "lux" was first employed by Preece during the 1889 Congress, to signify the light of 1 British candle at a distance of 12·7 inches. The word was quickly taken up by photometrists in Germany and France, but was afterwards employed in connection with metric units; and in the official "Proceedings" of the German Association of Gas and Water Engineers, and of the German Association of Electricians for the year 1897, was used as synonymous with the term "meter-kerze." The word lux is excellent for the purpose in view, being short and etymologically correct. Moreover, it is preferable, as will be argued later on, to such a word as meter-kerze, because it does not contain any portion of the words signifying a unit of length or a unit of illuminating power. Unfortunately, however, the suggestion that lux is synonymous with meter-kerze has introduced some uncertainty, because meter-kerze was first employed at a time when the German unit of illuminating power was the old "Vereins-kerze," one of which is equal to 1·2 Hefners. The strict definition of a lux is, of course, the amount of illumination falling upon a surface perpendicular to the rays of light from a source having the intensity of 1 Hefner unit at the distance of 1 metre.

The confusion that has arisen in this manner is of some importance, owing to the classical researches carried out by Professor Cohn during the year 1885. Cohn was engaged as an oculist in ascertaining the minimum illumination under which it was physiologically desirable that the human eye should be used; and, as a result of his work, he stated that the minimum in question was "10 meter-kerzen," and that an illumination of "50 meter-kerzen" should be provided if the eye were to see as well as by daylight without undue strain being put upon its muscles of accommodation. In spite of the fact that Professor Cohn's data referred to the old Vereins-kerze, his figures have been reproduced in all text-books, &c., up to the present day, and consequently leave upon the minds of the modern reader an incorrect impression of what he wished to convey. Converted into lux—that is to say, into Hefner-metres—Professor Cohn's figures become 12 lux as the hygienic minimum and 60 lux for a proper reading light.

It follows from the facts that there are at least three fundamental units of light employed at the present time and that British and American nations refuse to adopt the decimal system of linear measurement, that an almost indefinite number of illumination units appear in technical literature. At least eight of these units are to be seen in the journals of to-day—viz., the candle-foot, in Great Britain and the United States of America; the candle-meter,* used by the American Institute of Electrical Engineers; the carcel-metre and the bougie-metre, both used in France; the Hefner-foot and the Hefner-meter, both employed in the United States of America; the lux, used in Germany, France, and the United States of America; and the meter-kerze, used in Germany instead of the lux. A moment's consideration will show that there may be no end to the creation of derived units of this kind, for as the applied science of photometry and illumination spreads among the younger nations, we may encounter such curious terms as "carcel-arschin" or Hefner-yin."

There is even some uncertainty in British and American literature as to the proper name of the existing unit of illumination, for both "candle-foot" and "foot-candle" are to be met with. Dr. Monasch argues that neither term is permissible, both exhibiting the defect which is present in the German word meter-kerze. In the phraseology of the schools, the last word of a compound, in the English as in the German language, indicates the *genus proximum* of the whole, while the first word indicates the *differentia specifica*†. By analogy, therefore, a foot-candle should be

* The spelling "meter" is retained here and in the table below whenever reference is being made to German or American units, as the form "metre" is not employed in those countries.

† Dr. Monasch gives an example of this in the German language which may be paralleled in English by the two words "gas-oil" and "oil-gas." Gas-oil is an oil; oil-gas is a gas.

something having the nature of a unit of illuminating power; a candle-foot a unit of length. Again, as Clayton H. Sharp has but recently urged, in his Presidential Address at the first annual convention of the Illuminating Engineering Society held in Boston, U.S.A., last July, a compound term like candle-foot is altogether incorrect, because such a compound should convey the idea of multiplication between its components. The words "foot-pound" and "meter-kilogramme" do suggest such multiplication, whereas candle-foot does not mean 1-candle power multiplied by 1 foot, nor even 1-candle power divided by 1 foot, but 1-candle power divided by the square of 1 foot. Thus such words as meter-kerze, carcel-metre, and candle-foot, or foot-candle must be rejected.

Dr. Monasch proceeds to remark that, since the days of our childhood, we have learnt to think of linear measures in terms of metres or feet according to our nationality; and therefore those words and their multiples convey very definite impressions to our minds. Units of illumination are something quite different; and before we can intellectually appreciate what is meant by an illumination equal to so many units, we have to acquire much experience; and the experience can only be acquired by gaining definite mental pictures of the effect produced upon our eyes by the illumination afforded under certain standard conditions. For instance, the German, Frenchman, Austrian, and Swiss can easily teach themselves to realize that the illumination received by a surface under the full rays of the moon is equal to from 0·1 to 0·16 lux; that a man can just read by the light of 12 lux; and that the light of 60 lux is the weakest that enables him to read without straining the muscles of his eyes. Similarly, the Englishman and the American readily learn that the rays of the moon afford an illumination equal to from 0·015 to 0·03 candle-foot; while the minimum illumination under which print can be read is 1 candle-foot. The matter, however, becomes much more complicated when the illuminating engineer has sometimes to think in lux and sometimes in candle-feet; and confusion is the more apt to reign, inasmuch as the difference in the magnitudes of the arithmetical data is liable to convey the notion that the physiological quantities in question are different. The rays of the full moon afford the same amount of illumination everywhere. The weakest light under which the human eye can read is always the same wherever we live, irrespective of the units of length and illuminating power in which the illumination is quoted. Hence it becomes desirable that the word employed to designate the unit of illumination shall not directly present to our minds any particular unit of length or any particular unit of illuminating power, but merely a unit of illumination. Thus, as has been argued on other grounds, the word lux* ought to be adopted in preference to any other standard.

Seeing, therefore, that an international standard of illuminating power cannot be forced upon the illuminating engineers of all civilized countries, it seems desirable that engineers of each nation should be permitted to retain their own individual units—at least those which were mentioned in the earlier portion of this article. But, in these circumstances, it becomes necessary that a set of rigidly-defined factors shall be agreed to by all photometrists for the conversion of the different national units one into another or into the international lux. With the object of making the different units of illumination strictly comparable one with another and convertible into terms of the lux, Dr. Monasch has calculated out the table reproduced herewith. In preparing this table, the values adopted by the last (1907) International Committee on Photometry for the relationship existing between the English Harcourt lamp and Hefner unit have been employed; the English word "candle" being one-tenth of a Harcourt. It will be remembered that the standard British candle itself affords an average light 5 per cent. more powerful than one-tenth of a Harcourt; and therefore if the candle itself is to be retained as a standard, the figures in the table require some slight modification. The figures for the bougie-metre in the table have been calculated on the basis that 1 bougie-décimale is equal to 1·13 Hefners.

Comparative Values of Illumination Units.

		1.	2.	3.	4.	5.	6.
		Lux.	Hefner-foot.	Candle-foot.	Candle-meter.	Carcel-metre.	Bougie-metre.
1.	Lux (Hefner-meter)	1	0·0929	0·0848	0·9132	0·093	0·8849
2.	Hefner-foot . . .	10·76	1	0·9132	9·84	1·001	9·52
3.	Candle-foot . . .	11·78	1·095	1	10·76	1·097	10·43
4.	Candle-meter . .	1·095	0·1016	0·0929	1	0·1018	0·969
5.	Carcel-metre . .	10·75	0·9986	0·9115	9·817	1	9·513
6.	Bougie-metre . .	1·13	0·105	0·0958	1·031	0·1051	1

* The word lux is undoubtedly in more general use than Dr. Monasch's article would appear to suggest. No exception can be taken to his desire to see it employed to the exclusion of all other units; but it is curious that during his advocacy of the term he has said nothing as to whether the plural should be the Latin form "luces," as may be found in some American periodicals, or whether it should be treated as an invariable substantive.—THE ABSTRACTOR.

The Yorkshire Junior Gas Association will meet next Saturday at the Technical College, Halifax, when Mr. W. N. Booth is to give a demonstration with various photometric apparatus, &c., and Mr. J. W. Fell will address a few remarks to the members on "Ordnance Maps, and their Uses for Gas-Works Purposes."

GAS COMPANIES AND HOUSE FITTINGS.

By V. R. BALFOUR-BROWNE.

NOTHING is more remarkable in recent times, in connection with the supply of illuminants to the public, than the numerous and ingenious developments in the sale of gas. It was announced a short time ago, that the Gaslight and Coke Company received, during the previous year, between £600,000 and £700,000 in coppers for gas supplied by means of penny-in-the-slot meters. The introduction of these meters is an instance of the pushing of business, and the successful pushing, by the suppliers of gas; and it is beyond any dispute that developments of this kind have been rendered essential by the active competition which gas companies have had to encounter at the hands of companies and corporations which are supplying electricity. The President of the Board of Trade, in the debate upon the State purchase of railways, pointed out that the "unnecessary" competition between railway companies was by no means a benefit to the public; and the Socialists desire to put an end to the war of competition by establishing one tyrannical Commonwealth monopoly. But anyone familiar with the history of gas enterprise since the introduction of electricity for lighting purposes, cannot for a moment doubt that the public has reaped considerable benefits as a result of the keen competition between vendors of the rival illuminants, and the consequent stimulation of private enterprise.

I have already noticed the success of the penny-in-the-slot meter system, which has proved an immense benefit to numberless small consumers, and has also been a great advantage to gas companies in this competition. But these companies have found it necessary, in order to hold their own, to encourage the use of gas by small consumers—not merely by supplying gas by means of these meters, but also by supplying house pipes and fittings. A working-class population is, to a large extent, a shifting population; and a working man who is uncertain about remaining for any length of time in one house, would naturally be reluctant to go to the expense of putting in pipes to connect that house with the main, and of obtaining the brackets and fittings which are necessary for the consumption of gas. It, therefore, became essential, if gas companies were to secure such consumers, that the companies should supply these necessary articles, and should charge for them in the price of the gas supplied. It is said—and I believe with truth—that the charge so made is only sufficient to cover the bare cost of the articles, and that the companies' only source of profit, in this connection, is from the increased sale of gas which the supply of the fittings referred to has secured.

A somewhat interesting point has recently been raised in relation to these fittings, when the question was how to rate a gas company; and although in the South Metropolitan Company's case, which came before the London Sessions, the point was argued, the decision of the Magistrates did not show what view they took of the contention of the Company. In the case of the Ipswich Gas Company, however, the question was raised in the form of a special case for the opinion of the High Court of Justice, and was there decided. It is, of course, well known that one method (and that the usual method) of rating a gas undertaking, is to ascertain the rent that a tenant can afford to pay, and, by deducting the amounts which must be spent in order to maintain the hereditament in a condition to command the rent, to arrive at the rateable value. But, in order to find out what rent a tenant can pay, the gross receipts of the undertaking must be ascertained; and by deducting the working expenses the net receipts are found. It is the net receipts which have in some way to be divided between tenant and landlord.

The first question is, What will the tenant look for before he offers a rent at all? Naturally he expects the working of the undertaking to yield a profit; and it is therefore necessary to ascertain what profit will satisfy him. He has to find capital to conduct the undertaking. If he has capital, it must be taken from some other investment; if he has not, it must be borrowed. In either case he must first have interest on his capital; so that the gas undertaking must pay interest on the money invested in what is called tenant's capital, and, further, it must yield a profit to the tenant.

Now the question in the Ipswich case was whether the tenant was entitled to interest and profit on the money invested in prepayment meters, gas stoves, and cookers. It had been held in *Reg. v. Lee* (L.R. 1 Q.B. 241) that ordinary meters for measuring gas were matters of deduction—that is, they were to be treated as part of the apparatus for the provision of which the tenant would have to find capital. The argument, therefore, with regard to prepayment meters, stoves, and cookers was that they were, in principle, indistinguishable from ordinary meters, and should therefore be similarly treated as tenants' capital. And, on the ground apparently that the receipts from these appliances were included in the gross receipts, the decision of Justices Channell, Bray, and Sutton in the King's Bench Division, upheld that of the Recorder of Ipswich, and the contention of the Gas Company was held to be correct.

This is a very important decision in the interests of gas companies. Of course, the Act of Parliament had sanctioned the supply of these appliances, and had, too, protected them from distress. But the Acts of some other gas companies go further than allowing the companies to supply meters and stoves, and allow them to become plumbers for the purpose of keeping the

meters and stoves clean and in repair when supplied. And some rather nice questions have arisen in this connection, which are worthy of consideration.

I have pointed out that competition has in the past been, in large measure, responsible for the enterprise of gas companies; and this further development was found essential to their continued prosperity in many cases owing to the action in similar directions of their competitors—electric lighting companies or corporations. But several cases of further adventure on the same lines have come under notice. One gas company not only undertakes to "supply, deal in, and fix," but also to "repair and remove meters, engines, stoves, pipes, and other fittings." This seems to be legal under the clause in their Special Act; but by notice, it appears that the company are now prepared not merely to undertake the maintenance of incandescent and other gas-burners, but also the cleaning and renewing of all chimneys, globes, burners, &c. And they say further that no charge will be made for the men's time in doing this work; but customers will be charged only with the sale price of the materials and articles used. This appears to be an extension of the function of the company beyond the strict words of the Act, unless the "cleaning of globes and burners" falls under, and is included in, the words "repair of other fittings." Further, it appears that some of the consumers complain that the consequence of not charging for the men's time in doing such work, is that they (the consumers) are charged more for their gas than they otherwise would be. But, again, the excuse of the gas company is the keen competition with which they have to fight, and the advantage to the company and the consumers of having chimneys, globes, and burners well looked after. It is also an inducement to the householder to choose this form of illuminant; and, although doing the work for nothing would seem to involve an extra charge in the price of gas, it seems probable that the extra amount of gas consumed makes it up to the company, and that the other consumers therefore are not in reality paying for this work at all.

But even more questionable practices in the war of competition have come under observation. In a town where an electric light company is in competition with a gas company, it is to the advantage of each that the officials should be on good terms with the house agents. The house agents get the first authentic information as to the names of people who are intending to take houses in or near the town. Such information is, of course, important to the purveyors of gas or electricity, in order that they may get into communication with such person with a view to securing him or her as a customer. Now in the town presently in mind, competition has carried the electric lighting company to still greater lengths than it could possibly justify, if my information is correct. It is said that the company are offering to the house agents a commission of 6d. per light for twenty lights, and 3d. for every light after twenty, which is installed. The consideration for this payment is that the house agent is to recommend the tenant when taking the house to have the gas-fixtures removed, and electric fittings installed. The result of this business transaction between the electric light company and the house agents must be serious for the competing gas company. It is obvious that someone must repay to the electric lighting company this commission which has been paid by them to the house agents; and one can only conclude that it is paid by the consumers of electricity in the town.

The temptation is undoubtedly strong in this case for the gas company to enter into a similar business arrangement with the agents who have the letting of houses and the making or marring of illuminant companies in their hands. But such a course would I think be very ill-advised. The Prevention of Corruption Act, 1906, has not been very long on the Statute Book; and there are as yet no guiding decisions from the Courts of Law upon it. But the Act makes it a misdemeanour for any "agent to corruptly accept or obtain, or to agree to accept or attempt to obtain, from any person for himself, or any other person, any gift or consideration as an inducement or reward for doing or forbearing to do . . . any act in relation to his principal's affairs or business, or for showing or forbearing to show favour or disfavour to any person in relation to his principal's affairs or business." If then the house agent in the case referred to is agent for the person taking the house, the acceptance of the gift from the electric light company would clearly be within the section quoted; but whether he is the agent of the tenant or the landlord, the acceptance of the 6d. per light is perilously near the line.

I have referred to these cases to illustrate how fierce is the competition in these days between the perveyors of illuminants, and to indicate that, although competition within limits may be advantageous both to the public and to the companies—by encouraging enterprise, which may result in improved methods and better business arrangements—there are also methods of competition which, though they may result in injury to a rival, can certainly not redound to the credit of the company employing them. The problems that have been touched upon are connected with large social and political problems, which cannot be discussed here at length, but to which I may have occasion to return on another occasion, in so far as they bear upon the existence and prosperity of companies supplying gas.

A Profit-Sharing Scheme Adopted at Walker-on-Tyne.—We learn that, on the 14th inst., the Directors and also the shareholders of the Walker and Wallsend Gas Company unanimously adopted the South Metropolitan co-partnership system.

SHOP AND WINDOW LIGHTING.

THERE is probably no field of artificial lighting in which can be found greater diversity of method and result than that of shop and window illumination. It is difficult to visit any business street in the evening without noting the fact and at the same time finding as much to condemn as to admire in the general lighting of goods and merchandize. Some shops indicate that considerable attention has been given to the kind, the location, and the treatment of the luminants used; others, on the contrary, clearly suggest that the lights have been fixed without any thought of the purpose for which they were intended, or the illumination effect likely to be produced. Unhappily, there are numerous examples of the latter kind, particularly in small shops, evidencing lack of knowledge both on the part of the proprietors and the fitting firms engaged. Here, therefore, may be found excellent openings for progressive undertakings engaged in the sale of lighting commodities. Many companies, both gas and electric, now regard themselves as advisers to the customers whom they serve; and some material improvement in general lighting matters therefore is and may be expected. In spite, however, of enthusiasm and good intentions, their advice and efforts are not always accepted by consumers as being free from motives other than those of efficiency. The suspicion—particularly in the case of thorough business people—is now giving place to a certain amount of faith; and continued energy by lighting and distributing engineers is bound to be attended with success. The difficulty probably still remains for companies (decreasing in number) which have not as yet adopted the propagandist attitude. It is the first step which costs; but it is one which is not only worth taking, but should be taken by every lighting company if it really and truly deserves its name.

So far as gas undertakings are concerned, there is satisfaction in the fact that progressive business men are not likely to neglect opportunities of absolutely good lighting schemes, easily effected with considerable monetary saving, when the possible combination is once brought, as it should be, to their notice. Not a few gas companies have, as a consequence, already found customers, for a time enamoured with electricity, reverting to the use of gas. The fact carries with it the conviction that golden opportunities exist for active and successful campaigning so long as care is taken to ensure effective lighting design. Such propagandism is always within the power of companies, and probably of some few municipal departments. Unfortunately, the latter undertakings, both to their own detriment and to that of their gas consumers, are frequently restrained in such work by committees to whom the phrase "municipal trading" acts as a nightmare.

The American "Illuminating Engineer" usefully devoted the greater part of the January issue to articles on matters of shop and store lighting, accompanying them with illustrated examples of good, bad, and indifferent illumination methods—such examples, indeed, as can be met with in nearly every town. The importance of the subject must be unquestioned. From the point of view of the merchant or storekeeper, even if he does not altogether realize it, artificial lighting may make or mar his business. As our contemporary suggests, it determines to a large extent the general attractiveness of both shop and goods, and materially influences the buyer.

Mr. F. W. Goodenough, only the other day, reminded us of a further effect of good lighting—that of inducing shop assistants to keep the place in clean and tidy order. Effective lighting acts, too, as an excellent advertisement, and draws attention to a shop which might otherwise be unnoticed. One writer in the "Illuminating Engineer," Mr. G. W. Pearce, instances a case where large retail furnishers in Chicago decided in a reconstruction scheme to make the utmost of daylight by having as spacious window lighting as possible—not, however, neglecting to make the place a palace of light in the evening. They found, however, that their daylight trade in the new building had not strikingly increased over the previous average; but at night, with brilliant illumination, the store filled up to the great satisfaction of the proprietors. The advantage of good and effective lighting cannot too often be brought to the notice of merchants and storekeepers; and this fact requires reiterating in England quite as much as in the United States. The character, intensity, and method of this lighting are obviously matters which are best discussed in each particular case; and here distributing engineers—who virtually act in England as lighting, or, as the Americans phrase it, illuminating engineers—can do great things in advising their customers according to the construction and purpose of the shop, and the nature of the goods displayed.

So far as intensity of light for shop purposes is concerned, Mr. E. C. Elliott, the Editor of the "Illuminating Engineer," in his discussion of the subject, considers it sufficient to provide a range of from 2 to 5 foot-candles according to the class of goods handled, which may rank from white and light coloured fabrics to leather articles, men's clothing, &c. Tapestries, wall papers, and the like, being displayed usually in the vertical plane, will require the higher intensity, as will also floor coverings, furniture, and similar goods. In small shops, where miscellaneous merchandize is sold, an average of (say) 3 to 4 foot-candles may be used. While excessive intensity is to be avoided, insufficient light is simply an inexcusable failure to properly show merchandize. It is rightly pointed out that the intensity should be varied to suit particular classes of goods; otherwise bad effects may be

produced, as, for instance, that of apparent gloom in going from a light to a dark-coloured goods department.

Mr. Elliott divides artificial light in relation to colour into three classes. First, warm or mellow, containing a greater amount of red or yellow rays and covering light sources, such as flames, incandescent gas and electric lamps, Nernst, and flaming arcs; second, neutral or white, of which diffused sunlight may be taken as a standard; and third, cold or hard, characterized by a greater proportion of blue or green rays, in which class come unshaded arcs. No cold or hard light is preferable to either a neutral or a warm light; but places exist in which it is not objectionable, as, for instance, where the colour of the light is quite immaterial. Generally speaking, goods should be displayed under the same quality of light in which they will be seen when in use. There are, however, few cases in which a neutral light will not be satisfactory. But exceptions worth mentioning are those of coloured fabrics used for evening dresses, furniture, and house fittings, rarely seen in brilliant daylight, and mens' clothing, which, with their prevailing dark shades, have a normal appearance in a warm toned light. Millinery goods, on the other hand, necessitate a neutral or white light, since their colours are usually seen in daylight.

Modification of the colour of light sources may be effected by reflection, as also by means of tinted and other globes, but is attended with more or less loss of light in the resultant illumination. So far as distribution of light is concerned, the question of size of unit is frequently one of taste or cost. The size of the light source should, however, bear some relation to that of the place to be lighted. Their position also will probably have to be fixed with some idea of compromise between structural conditions and considerations of light distribution. It should always be borne

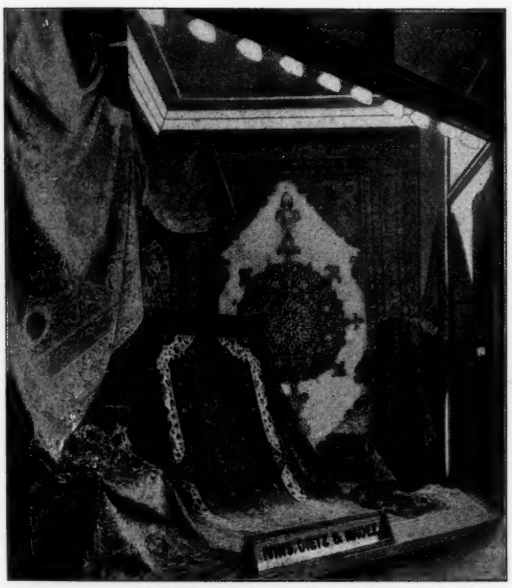

Fig. 1.

in mind that the distinguishing feature of the modern idea of trade is to make the shop a thoroughly attractive place, rather than a mere show-room for merchandize. In speaking of enclosed arcs as developing into a less ugly form, and becoming even capable of decorative design, our contemporary remarks that the so-called gas arc lamps are readily susceptible of highly decorative treatment, adding very materially to their desirability for shop illumination. Shop or store lighting is first and foremost utilitarian; and, in seeking for decorative effects, care must be taken that the desired illumination is not reduced or distorted. After dealing with matters of cost, incidental reference being made to the "well-known fact that mantle gas-burners still afford the cheapest method of producing a given quantity of light," Mr. Elliott draws attention to the necessity of keeping all lighting systems in first-class order by regular inspection, cleaning, and renewals.

Following on the same subject, Mr. Litle, jun., contributes a good paper on show-window lighting by gas; giving illustrated examples of what can be effectively done in this direction. Commencing with the postulate that there exists a definite demand on the part of merchants and shopkeepers for higher illumination and better distribution in shop-window lighting in consequence of its considerable advertising value, the writer remarks that the very necessity of good lighting makes the question of cost an important business factor. For the shopkeeper, the lighting bill is almost as much as the rent; and as it is becoming the practice to leave the lamps in the window burning till late in the evening for advertising purposes, the problem is a very serious one. The matter of economy, therefore, is likely to be uppermost in the minds of business people; and they will look for the system which will not only give the best illumination, but do so at a reasonable cost. Mr. Litle says that during the past year great

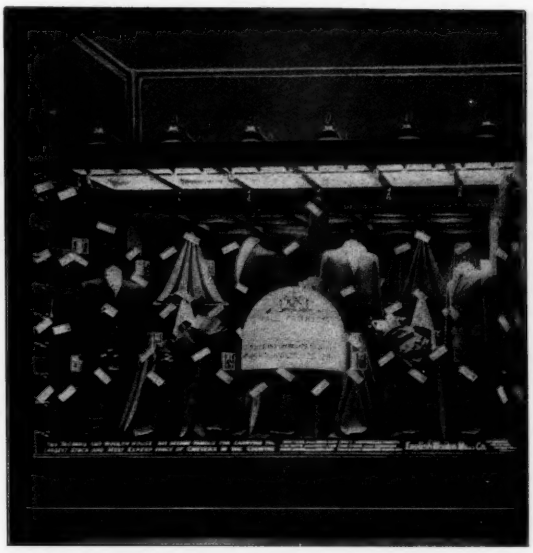

Fig. 2.

changes have been made in shop-window lighting, both in the use of gas and electricity; but progress has been most marked in gas lighting, owing to the successful application of the inverted burner. Even to the lay mind it is at once apparent that this type of burner is admirably adapted to shop-window lighting, on account of the great downward light and the ease with which it can be applied to all existing conditions. The construction of the inverted burner is such as to allow the gas-piping to be kept overhead and out of the field of illumination, and proves advantageous not only for deck, but for open-window lighting. The mantle is strong and durable, which, coupled with its great efficiency and high intrinsic brilliancy, places it in the front rank of artificial illuminants.

Shop-window illumination may be classified under the following heads: Open-window lighting, in which the lamps are hung directly in the window; deck lighting, in which the window is sealed and lighted from above a transparent or translucent deck or ceiling; and windows lighted from the outside of the building. In lighting shop windows, it is best to have the lamps so located that they will be out of range of vision, and to avoid studding the sides and back of the window with lamps which tend to distract attention from the goods exhibited. Mr. Litle remarks upon the fact that the movement towards the newer system of shop-window lighting by incandescent gas has spread in the States, and all the large cities now contain hundreds of examples of inverted burner lighting; the practice now spreading to smaller towns. The method adopted in open-window lighting is frequently that of hanging the burners near the top of the window and equipping them with angle reflecting shades, which throw the light downward and well back into the window (see fig. 1). In another case, mirror glass reflectors were used with inverted burners arranged in two rows under the high window ceiling. The light was very uniformly distributed over the window; and as the lamps were out of the field of vision, the display was brought into relief without objectionable glare.

The writer also gives examples of deck lighting. In one case, the window is closed in at the top by panels of ground glass, thus

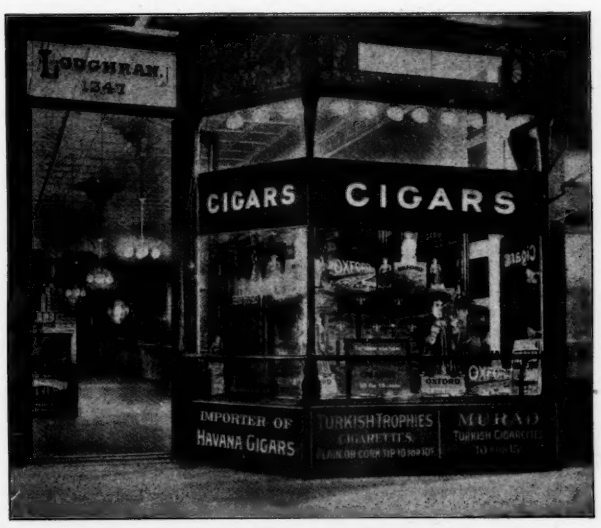

Fig. 3.

protecting the goods from dust. Over the glass panels is a row of twelve inverted burners equipped with mirror glass reflectors, and resulting in a wide distribution of light over the entire display of goods (see fig. 2). A further example of effective shop and window lighting is given in fig. 3. The inverted burners are here furnished with green plated angle reflector shades; those inside the store having 5-inch ball globes. These particular installations are lighted and extinguished with independent pilot systems—that is to say, by means of a separate gas-pipe line supplying each burner with a small pilot flame.

Mr. Litle, in commenting on the flexibility of the inverted burner principle, points out how readily is its application to shops, large and small alike, in every place where gas is available. As the system has no competitor from the standard of economy and cost of operation, the field is an exceedingly fertile one, and offers unusual opportunity for the gas industry.

WATER PROVISIONAL ORDERS FOR 1908.

In preceding issues of the "Journal," we have noticed the proposals in regard to water supply for which parliamentary sanction is being sought by Bills. It now remains to indicate the nature of the applications made for Provisional Orders.

The Brough Water Order is to authorize the construction and maintenance of water-works and the supply of water in the parish of Elloughton-with-Brough and part of the parish of Brantingham, in the East Riding of York. The applicants for the Order are Colonel H. B. Harrison Broadley, M.P., Mr. A. J. Atkinson, and Mr. G. R. Ouston; and the capital proposed to be put into the undertaking is not to exceed £6000, with borrowing powers to the extent of £2000, all to carry interest at a maximum rate of 5 per cent. Power is asked to impound waters and construct works, consisting of two collecting chambers, a service reservoir, and five conduits or pipe-lines, to be completed within the time and subject to the conditions prescribed by section 11 of the Gas and Water Works Facilities Act, 1870. The charges for the supply of water are to be based on the rateable value of the premises served. Under £5, the rate is to be 8s. 8d.; and the other charges range from 8 per cent. downwards. For each closet beyond the first, up to 5s. extra may be charged, and up to 10s. for a bath. For water supplied by measure the price is not to exceed 2s. 6d. per 1000 gallons, with 15 per cent. on the cost of the meter as its rent. [*Parliamentary Agents: Messrs. Lees, Butterworth, and M'Donnell.*]

The Burgess Hill Water Company wish to have the portions of their Act of 1886 repealed which authorize them to supply water in certain parts of the parishes of Clayton and Keymer, in the rural district of Cuckfield, and their limits extended so as to include the parishes of Albourne, Twineham, Westmeston, and part of Wivelsfield. No additional capital is applied for. [*Parliamentary Agents: Messrs. Crowders, Vizard, Oldham, and Co.*]

The Sevenoaks Water Company ask to be authorized to raise additional capital not exceeding £30,000, including premiums, and to borrow on mortgage to the extent of one-fourth of this amount. The new capital is to be put up to auction or tender; and the dividend is not to exceed 7 per cent. on ordinary and 5 per cent. on preference capital. Power is required to create debenture stock, on which not more than 4 per cent. is to be paid. [*Parliamentary Agents: Messrs. Bircham and Co.*]

The Stourbridge Water Order is to enable the Stourbridge Water Company, Limited, to extend their limits of supply by the inclusion of the parishes of Belbroughton and Broome, in the county of Worcester, and raise additional capital to the extent of £20,000, with borrowing powers in respect of one-third. The dividend is limited to 7 or 6 per cent., according as the capital is issued as ordinary or preference; and the interest on borrowed money to 5 per cent. [*Parliamentary Agents: Messrs. Grahames, Currey, and Spens.*]

The following Provisional Orders have been applied for through the Scottish Office.

The Falkirk and District Water Order is to authorize the Falkirk and Larbert Water Trustees to construct and maintain additional works for the supply of water to the burgh of Falkirk and the adjacent districts and places, and to sanction certain works already constructed. The new works consist of two conduits or pipe-lines in the parish of Larbert and one in the parish of Denny, all in the county of Stirling; and they are to be completed in three years. Powers conferred upon the Trustees by their Act of 1900 in respect of certain works specified are revived and extended for a period of ten years from the commencement of the Order. Additional borrowing powers to the amount of £75,000 are sought. The Acts of 1888, 1896, and 1900 are to be amended in respect of the rates and charges for water; and the Trustees may supply water for other than domestic purposes by measure at a price not exceeding 8d. per 1000 gallons, or at the domestic or any special rate fixed from time to time by them and approved by the Sheriff. From the commencement of the Order, the Trust is to consist of the Town Council and five Elective Trustees rated in the Larbert Division for either the domestic or the public water-rate. [*Parliamentary Agents: Messrs. A. & W. Beveridge.*]

By the Lanark Corporation Order, authority is sought for an extension of the municipal and police boundaries of the burgh in accordance with a schedule to the Order; and, of course, the limits of water supply will be those of the enlarged area. [*Parliamentary Agents: Messrs. A. & W. Beveridge.*]

The District Committee of the Middle Ward of the County of Lanark require authority for the construction of additional water-works, consisting of an enlargement of their existing reservoir in the parish of Avondale, a service reservoir in the parish of Carmunnock, and five aqueducts or pipe-lines. The reservoir enlargement is to be completed within ten years, and the other works within seven years, from the commencement of the Order. The time specified by the Order of 1902 for the completion of the Glengavel reservoir is extended by five years—viz., to July 2, 1914. The Committee's limits of water supply are to be enlarged as defined in the Order; and the provisions of their Water Acts which prohibit the supply of water by them within the limits of the Busby Water Company are to be repealed. Borrowing powers are required for obtaining the necessary funds to carry out the works specified. [*Parliamentary Agents: Messrs. Grahames, Currey, and Spens.*]

The St. Andrews Water Order is to authorize the Provost, Magistrates, and Town Council of St. Andrews to provide an additional water supply, and construct and maintain new works. These consist of a reservoir on the Dunino Burn, in the parishes of Carnbee and Dunino, a water-tank in the parish of Cameron, intake weirs, conduits, and access roads, all in the county of Fife. Ten years are required for the completion of the works. The limits of compulsory supply are to be the burgh of St. Andrews. The water need not be constantly laid on under pressure, nor supplied at a higher level than can be reached by gravitation from the service reservoirs. The Town Council ask to be authorized to borrow whatever money they require for the purposes of the Order and for repaying the sum of £21,068 7s. 11d. now remaining unpaid in connection with the existing water supply, to be repaid, as to the additional money borrowed, within fifty years, and as to the outstanding amount within thirty years, from the commencement of the Order. [*Parliamentary Agents: Messrs. A. & W. Beveridge.*]

The Troon (Loch Bradan) Water Order is to enable the Provost, Magistrates, and Town Council of Troon to provide an additional water supply, and construct and maintain new water-works. It is proposed to construct an embankment for the purpose of raising the waters of Lochs Bradan and Lure (the waters of which are to be taken), in the parish of Straiton, and it will be situated across the stream known as the Water of Girvan, where it flows out of the northern end of the first-named loch. The other works consist of three conduits or pipe-lines and an access road; and all are to be completed within ten years from the commencement of the Order. Borrowing powers are required for the construction of the works and the liquidation of a sum of £17,568 outstanding; the periods for repayment being sixty and forty-five years respectively from the commencement of the Order. The Council also wish to be allowed to borrow money to pay interest at the rate of 4 per cent. during the construction of the works; and they ask for ten years in which to repay it. Authority is sought for the Council and landowners and others to agree as to a supply of water on the line of pipes. Except in the case of supply by measure, water is to be paid for in advance; and in the case of meter supplies, each consumer may be required to pay such deposit by way of security as may be deemed necessary. [*Parliamentary Agent: Mr. J. Kennedy.*]

Tar-Spraying for Roads.

Mr. J. H. Mitchell, the Surveyor to the Northfleet District Council, has submitted a report of his experiment on tar-spraying the roads. In the course of it he says: "The two roads which were tar-sprayed in September last have, on the whole, continued since the treatment in a satisfactory condition. I have noticed in both roads a marked decrease in the mud produced in wet weather, and though it was too late in the season to get a lengthy test as to the reduction of dust, I am given to understand that the residents (particularly those in Springhead Road) noticed a considerable relief from this after the application of the tar to the road surface. I am satisfied that a tarred surface is incapable of withstanding the action of skidding, and on gradients where it is necessary to use a skid-pan, tar used in this manner should be confined to the channels, where it is of considerable benefit in protecting the road surface from storm-wash. In order to further test the value of tar-spraying, I suggest that several roads be treated as early in the spring as weather will permit. The roads most benefited by tar-spraying are those carrying light traffic, in which case the treatment is quite satisfactory. I am of opinion that any attempt to use tar on roads with considerable traffic should be carried out with tar macadam, as the skin of sand and tar formed by surface application quickly becomes broken up and worn off on roads of this description."

The Council of the Royal Society of Arts, acting upon the report of a Committee of Judges, have awarded the gold medal offered by the Society, under the Shaw Trust for Industrial Hygiene, to Professor William Galloway, "in recognition of his valuable researches into the action of coal dust in colliery explosions, the outcome of which researches has been the provision of means by which the risk of such accidents is materially diminished, and a consequent great saving of human life effected."

INVERTED GAS-LIGHTING.

By M. C. Whitaker.

[A Paper read before the Philadelphia Section of the Illuminating Engineering Society.]

The most important step in the improvement of illuminating devices embodying the use of the Welsbach mantle is now being made in the commercial introduction of inverted incandescent gas-lamps. Large numbers and varieties of these lamps have appeared within the last few years; and the activity shown by manufacturers and promoters of this type of lighting device must naturally suggest to the minds of those interested in gas lighting that there are some basic reasons for this development. It is the purpose ot this paper to indicate these reasons and to review the problems encountered in the development and introduction of this system of lighting. Its commercial outlook is exceedingly promising; and it behoves those interested in the use of gas illumination to familiarize themselves with the problems involved, and the present trend of developments.

The primary reasons which tend to explain the interest in the inverted incandescent gas-lamp may be indicated as follows: (1) Improved efficiency and economy. (2) Better direct downward distribution of the light. (3) Superior decorative possibilities. (4) Greater durability and longer candle-power life of the mantle. (5) Units naturally adapting themselves to all conditions and uses. In addition to these primary reasons, many minor advantages may be cited which place the inverted gas-lamp on the highest plane for economical general illumination.

The accompanying tables will serve to show the comparative cost of operating the various lighting systems now in common use for indoor illumination. The candle power and consumption figures quoted in these tables are taken from actual tests made by expert observers and quoted from standard authorities. The rates are based upon the average quoted prices in our largest cities. The full meaning of the figures given in the table may be made clearer by reference to the statement representing the comparative amounts of candle power obtained for 1 c. cost for the different systems of lighting.

Table I.

Gas.

Light.	Rate per 1000 C.Ft.	Cubic Feet per Hour.	Mean Sph. C.P. of Unit.	Cost per Hour of Unit.	Quantity for 1 Cent.	
					Cons.	Mean Sph. C.P.
	$			$		
Acetylene gas	15·00	0·5	12·7	0·0075	6·66	16·9
Open-tip burner	1·00	5·0	21·0	0·0050	10·00	42·0
Gas arc, clear globe	1·00	18·8	228·7	0·0188	10·00	121·6
Upright mantle, clear chimney	1·00	3·7	63·0	0·0037	10·00	170·0
Inverted mantle, clear chimney	1·00	3·0	54·0	0·0030	10·00	180 0

Electricity.

Light.	Rate per Kilowatt.	Watts per Hour.	Mean Sph. C.P. of Unit.	Cost per Hour of Unit.	Quantity for 1 Cent.	
					Cons.	Mean Sph. C.P.
	$			$		
Cooper-Hewitt	0·10	192	238·96	0·0192	100	124·40
Enclosed arc	0·10	600	213·00	0·0600	100	35·50
Gem, clear bulb	0·10	125	40·70	0·0125	100	32·56
Nernst, clear globe (3-glower)	0·10	264	81·00	0·0264	100	30·70
16-candle power Edison	0·10	55	13·20	0·0055	100	24·00

Table I. is based upon the mean spherical candle power obtained by taking the average of the candle-power readings at points 10° apart in a vertical plane through the centre of illumination—see fig. 1. The comparison shows a larger candle-power yielded per unit of cost for the inverted incandescent gas-lamp; but calculations based upon the spherical candle power are very misleading, and a further study of the direction of distribution is interesting.

Inasmuch as the source of illumination in the standard installations is usually overhead, it is apparent that the light distribution above the horizontal plane through the source is largely wasted, unless some medium of reflection be installed to divert the light into the lower portion of the room. It therefore follows that a source of light which gives its main distribution below the horizontal plane, without the necessity for the use of a reflector, occupies a position of great advantage and economy.

Where the greater percentage of direct light falls above the horizontal plane, it is necessary to use reflectors to divert it into the lower portion of the room. Its reflection cannot be accomplished without a certain loss—this loss depending entirely upon the efficiency of the reflecting medium. On the other hand, the direct rays of light naturally distributed in the field below the horizontal plane serve the purpose for which they are intended without loss. It seems fair, therefore, in considering the value of a source of light for illuminating purposes, that the factor of lower hemispherical candle power, rather than the total spherical candle powers, should be regarded as of principal importance.

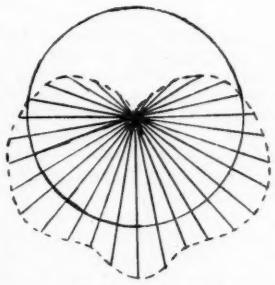

Fig. 1.—Relation of Mean Spherical Candle Power to Curve of Distribution.

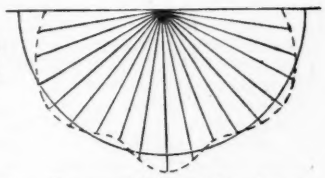

Fig. 2.—Relation of Mean Lower Hemispherical Candle Power to Curve of Distribution.

Table II.

Gas.

Light.	Rate per 1000 C. Ft.	Cubic Feet per Hour.	Mean L.H. C.P.* of Unit.	Cost per Hour of Unit.	Quantity for 1 Cent.	
					Cons.	Mean L.H. C.P.*
	$			$		
Acetylene gas	15·00	0·5	11·60	0·0075	6·66	15·50
Open-tip burner	1·00	5·0	20·00	0·0050	10·00	40·00
Gas arc, clear globe	1·00	18·7	244·00	0·0188	10·00	129·80
Upright mantle, clear chimney	1·00	3·7	51·27	0·0037	10·00	138·50
Inverted mantle, clear chimney	1·00	3·0	70·60	0·0030	10·00	235·33

Electricity.

Light.	Rate per Kilowatt.	Watts per Hour.	Mean L.H. C.P.* of Unit.	Cost per Hour of Unit.	Quantity for 1 Cent.	
					Cons.	Mean L.H. C.P.*
	$			$		
Cooper-Hewitt	0·10	192	238·96	0·0192	100	124·40
Enclosed arc	0·10	600	329·05	0·0600	100	54·84
Gem, clear bulb	0·10	125	36·96	0·0125	100	29 56
Nernst, clear globe, 3-glower	0·10	264	144·26	0·0264	100	54 60
16-candle power Edison	0·10	55	11·68	0·0055	100	21·78

* Lower hemispherical candle power.

Comparative Amounts of Candle Power-Hours Obtained for 1 Cent. Lower Hemisbherical Readings and Spherical Readings.

	Lower Hemispherical.		Spherical.
Gas—			
Acetylene	5	..	4
Open-tip burner	11	..	10
Gas arc: clear globe	32	..	30
Upright incandescent light	34	..	42
Inverted ,, ,,	58	..	44
Electricity—			
Cooper-Hewitt—Type H D.C.	31	..	31
Electric arc, enclosed	14	..	9
Nernst lamp	14	..	8
Gem—clear bulb	8	..	8
Edison—16-candle power	6	..	7

Table II., with its accompanying statements, shows the comparative amount of light obtained for 1 c., based on readings of the lower hemispherical candle power—see fig. 2. The tests are based upon burner equipments without any reflecting glassware; it being assumed that a reflector can be used with equally effective results in any or all of the cases cited.

It will be noted from Table II. that an enormous advantage obtains in favour of the inverted incandescent gas-lamp. Considering the various lighting systems now in use with special reference to the production of illumination at a minimum cost, this advantage is so pronounced that it cannot be overlooked. This fact alone offers a very convincing reason for the prevailing interest and activity in the development and application of the inverted system of incandescent gas lighting.

The inverted gas-lamp combines useful illumination with artistic and decorative effects not attainable in any other system. The lighting unit is of such a size that its direct downward distribution meets the requirements of ordinary illumination, while the light distributed in the upper hemisphere is available for utilization in producing beautiful and decorative colour effects with various designs of globes and shades. Chandeliers, brackets, pendants, and dining-room fixtures, especially designed in both metal and glass equipment, have been provided in infinite variety to meet the favourable decorative possibilities offered by inverted gas-lamps.

The inverted lamp naturally gives a free downward distribution of light, with a resultant illuminating effect which cannot be obtained by the upright incandescent system, from the fact that the greater portion of the candle power yield of the upright gas-burner is in the upper hemisphere—thus necessitating the use of reflecting shades more or less inefficient in operation. Moreover, notwithstanding the use of these reflectors, it is not possible to overcome entirely the loss due to shadows caused by the interposition of the metal parts of the burner, chandelier, &c., directly in the path of the downward distribution of the light.

The inverted lamp has no structural parts interposed in the path of illumination. Without the use of reflectors, it gives the greater percentage of its candle-power distribution directly into the portion of the room which requires illumination; and from these essential features, it follows that by the use of special reflectors, designed for concentrating and directing the rays of light, results embodying unusually high economy may be obtained.

Mantle renewals of the inverted lamp must be considered a factor in estimating the cost of operation. Whether or not this is a greater factor than the various renewal items entering into the maintenance of the other forms of illuminating devices, does not appear from any figures available. The experience so far obtained is that renewal cost for mantles for the inverted lamp is very materially less than for the upright burner. The construction and size of the mantle are such as to give it greater physical strength.

Many designs of mantles are now in use; and, unfortunately, there are several standard fittings for attaching these mantles to the burner. The best quality mantles are mounted on magnesia rings with projecting fingers to hold the mantle in position on the burner. Metal rings have been used to some extent, but have not proved desirable, on account of the corrosive action of the flame.

A lighting unit furnishing from 50 to 100 candle power is found by experience to be better suited for general use than the smaller units, as furnished by individual incandescent electric lamps, or the larger units, as furnished by arc lamps. In gas lighting, the demand for larger units is met by cluster lamps; but for lighting machines, office desks, reading tables, residences, &c., a unit of less than 50-candle power would not be sufficient to meet general requirements.

The development of the inverted incandescent gas-lamp divides itself into two distinct epochs. The first inverted incandescent lamps were made by Clamond, and exhibited in 1882-3 at the Crystal Palace, London, and the Paris Exposition. Considerable activity was subsequently shown by inventors, and numerous forms were exploited without commercial success. This was prior to the successful development of the thorium-cerium mantle by Dr. Auer von Welsbach; and the incandescing devices used in these early lamps were in the form of magnesia baskets, platinum cones, &c. Furthermore, the burners used in these demonstrations were successful only when compressed air, or compressed gas, or both, were utilized. Their construction at that time did not overcome the problem of producing combustion with the burner inverted, except by the use of an abnormal pressure. With the advent of the Welsbach upright mantle, this line of research was abandoned; and no developments of any consequence were made for eight years.

The interest in the inverted incandescent gas-light was renewed by the development of a burner for the utilization of a thorium-cerium mantle, which was shown abroad about 1900. These inverted lamps did not meet with marked commercial application in America, because their designers failed to take into account the principles which modern inverted burner builders recognize as basic. The early burners served, however, to acquaint illuminating engineers with the many points of superiority to be obtained by the use of the inverted light; and experimental activity was greatly increased, with a view to overcoming the many difficult problems in design, construction, and operation in this type of lamp.

The history of the modern inverted burner is confined almost entirely to the development of various systems of meeting the complicated conditions of inverted combustion; and a careful study of the difficulties and principles involved in the production of the most recent forms of inverted lamps will serve to show the trend of development.

Two general divisions may be made, which involve the utilization of different principles of combustion. The first is based on a burner calculated to pre-heat the gas or air, or the mixture; and the other is a type where the construction is so arranged as to avoid, as far as possible, increasing the temperature of the gases before they reach the point of combustion.

The advantage of pre-heating the gases before combustion is questionable; and prominent authorities may be quoted for and against the increased efficiency to be obtained by this method. From a theoretical standpoint, it might be inferred that the incandescence of the mantle would be increased by raising the initial temperature of the gases before entering the combustion chamber; but practical results show conclusively that the abnormal rarefaction of the gases due to the increased temperature of the mixture tends to produce the opposite effect.

On the other hand, artificially cooling the gaseous mixture before combustion produces a decrease in the efficiency of the inverted lamp. Furthermore, the pre-heating or extreme cooling of the mixture necessarily complicates the construction of the burner.

Based upon these observations, inverted burner designers are usually adopting the medium system, and are constructing a burner so that the gaseous mixture will maintain a temperature ranging between the extremely hot gases produced in the regenerative type and the cold gases produced in the cooling type. The development in the art at the present time is largely based upon the adoption of the medium system.

In modern practice, inverted burner construction falls under three general designs: (1) The upright bunsen, with the tube carrying the gas and air mixture curved through half the arc of a circle. (2) The horizontal bunsen tube, with the mixing-chamber curved through one-quarter of an arc. (3) The vertical bunsen, with a straight tube for the delivery of the mixture to the point of combustion.

Modifications of these designs are noted, in which the bunsens are placed at various intermediate angles; but they are not in sufficient favour to be considered in a general classification. The prevailing types of inverted burners now on the market fall under these classifications.

In the study of the problems involved in the proper design, construction, and use of an inverted gas-lamp, special consideration must be given to the following points: (1) The production of a proper mixture of gas and air under all conditions of operation, so as to ensure a perfect combustion. (2) Means for positively preventing flash-backs under all conditions of operation. (3) Special construction of the bunsen tube designed to project the gas and air mixture downward to the point of combustion with maximum velocity, thereby overcoming the ascending tendency of the mixture, due to its light specific gravity. (4) The elimination of gauzes, long and circuitous passages of the mixture, or any other features offering frictional resistance to the projection of the gases toward the point of combustion. (5) The protection of the fresh air supply from vitiation by the products of combustion. (6) Well-designed and constructed adjustable gas-check. (7) The effect of the corrosive action of the flame at the point of combustion; and the necessity of refractory construction at this point. (8) Good mantles. (9) Glassware and reflectors specially selected and adapted for effective and economical distribution of the light.

In the study of combustion as applied to the bunsen burner, we recognize three basic essentials: (1) The combustible, represented by the gas; (2) the supporter of combustion, represented by the oxygen of the air; and (3) the kindling temperature necessary to start the combustion, applied through the medium of a match or some other heating device. Eliminate any one or more of these three essentials, and combustion ceases.

The combustion is the chemical union of the active constituents of the gas with the oxygen of the air; and the products of this combustion are definite chemical compounds in which the proportions never vary. Therefore, when a certain amount of gas is admitted to the mixing-tube of the bunsen burner, a certain definite amount of oxygen (air containing oxygen) must be entrained and mixed with it in order completely to consume the combustible constituents of the gas. If the air supply is insufficient to meet these requirements, unconsumed, or partially consumed, constituents of the gas will be discharged from the burner, either in the form of solid particles of carbon or as noxious gases. On the other hand, an excess in the supply of air results in a great reduction in the incandescing power of the flame, and carries the mixture beyond the critical point, which may result in a "flash-back."

It is the true function of a bunsen burner to take in and mix with the gas in the mixing-tube air containing the exact amount of oxygen required to consume all the combustible constituents of the gas and convert these into inert, harmless products.

A bunsen burner which meets these conditions derives the maximum heating value from the gas consumed and produces perfect combustion—both essential features in an efficient incandescent gas-burner.

The working conditions of the upright burner are such that, when the proper proportions of gas and air are once fixed, perfect combustion will continue as long as the composition and pressure of the gas remain uniform. A perfect mixture in the bunsen tube is indicated by the formation of the characteristic blue cone in the non-luminous flame. If the proportion of air is reduced beyond the proper point, the flame will change to the luminous variety, due to the incandescent particles of carbon. On the other hand, if the proportion of gas is reduced below the critical point, a flash-back will result, unless prevented by the introduction of some mechanical appliance, such as a gauze.

Having in mind the characteristics of a flame which indicate perfect combustion, a study of the form of flame produced by the elementary inverted bunsen burner shows that a new condition is introduced in this form of lamp. When the simple form of inverted burner is lighted, and the gas and air proportions adjusted for the formation of a flame indicating perfect combustion (fig. 3), it is observed that the characteristic non-luminous flame gradually changes, as the burner becomes heated, to a longer and more luminous flame (fig. 4), indicating that the proportions of the mixture have been changed by the reduction of the quantity of air entrained by the mixer. Inasmuch as this change does not take place until the burner tube becomes heated, it is safe to conclude that the modification in the proportions of the mixture is due to the rarefaction of the gases by the heat in the mixing tube, which prevents the aëration of the mixture in the same proportions as when the burner is cold. On the other hand, if the gas

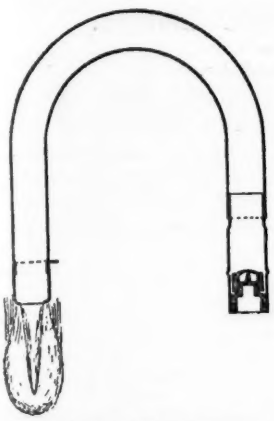

Fig. 3—Inverted Bunsen Flame when First Lighted.

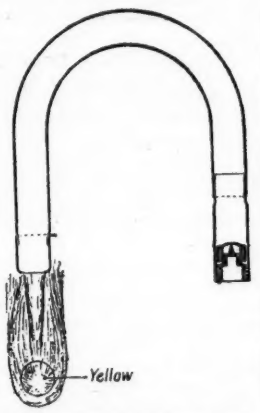

Fig. 4—Inverted Bunsen Flame after Ten Minutes' Burning.

and air mixture is adjusted while the burner is hot, it is found that, on relighting the burner after it has thoroughly cooled, the proportion of air exceeds the critical point, and the burner will flash-back, unless prevented by some mechanical means; and even if the flash-back is prevented, the over-aëration materially reduces the mantle incandescence.

These observations established in the minds of the early investigators of this subject the idea of so constructing a burner as to regulate mechanically the amount of air admitted to the burner, and to govern this mechanical regulation automatically by means of the heat developed by the burner—in other words, to utilize the heat which was the cause of the change in the composition of the mixture automatically to readjust the mixture to meet the requirements of perfect combustion.

It is obvious that the users of an inverted burner cannot be expected to readjust the lamp every time it is lighted, and to wait until it is thoroughly heated in order to put on the finishing touches of a proper adjustment. An automatic compensating device, which permits of the burner being properly adjusted when first lighted, and which will gradually increase its air-entraining capacity as it becomes more heated from its own combustion, is obviously a feature upon which depends the success of the inverted incandescent gas-burner.

Face to face with the positive necessity for this automatic compensating device, the situation is met by the invention of an attachment technically known as a "thermostat." The operation of the thermostat depends upon the fact that it is constructed from two pieces of metal possessing different coefficients of expansion when heated, and which are rolled together to form a single sheet. The thermostat, as applied to the inverted burner, is made by the formation of a slitted cone from a small sheet of this metal. It is placed in the mixing chamber of the lamp in such a position as to be well protected from the corrosive action of the burning gases, and at the same time within range of the heat due to the combustion. When the mixing tube becomes heated, the fingers of the thermostatic cone open for the unobstructed flow of the gas and air mixture as long as the tube remains heated. When the light is extinguished and the tube allowed to cool, the thermostat automatically assumes the conical form.

By maintaining the proper relations between the size of the mixing chamber and the dimensions of the thermostatic cone, it will be found that when the burner is cold, the closed fingers of the thermostat interpose a sufficient amount of resistance to the entraining capacity of the mixing tube to prevent over-aëration. As the tube becomes heated and the thermostatic fingers open, this resistance is removed at a proper rate to compensate exactly for the reduced entraining capacity occasioned by the gradual heating of the tube. Fig. 5 is a sketch of the flame of a burner containing the thermostat, showing the form at the moment of lighting; and fig. 6 shows the same flame after the burner has been lighted some time and has become thoroughly heated.

The fact that the flame in a thermostatically controlled burner remains practically uniform throughout the change from the cold to the heated state, establishes beyond any question the practical value of this device for automatically controlling the gas and air mixture for the production of perfect combustion in inverted gas-burners.

The direct cause of a flash-back is an explosive action which carries the flame into the mixing tube and sets up combustion at the gas-orifice. This explosive action occurs in several ways; the common cause being the existence of an over-aërated mixture in the burner-tube. It sometimes occurs, on lighting an incandescent gas-burner, that an explosion takes place in the glass chimney or globe with such force as to drive the flame back into the mixing tube of the burner. The usual method used for overcoming the tendency to flash-back is that of placing a gauze in the burner tube at or near the point of combustion. This gauze serves to maintain the mixed gases in the burner tube at a temperature somewhat below the kindling temperature, and thereby prevents a flash-back. This will be recognized as the principle involved in the safety-lamp invented by Sir Humphrey Davy.

The use of the gauze in the inverted burner for the purpose of

Fig. 5—Inverted Bunsen Flame when First Lighted.

Fig. 6—Inverted Bunsen Flame after Burning Ten Minutes,

Thermostatically Controlled Type.

preventing "flash-backs" is objectionable on the ground that it obstructs and materially retards the downward projection of the mixture in the burner tube, thereby defeating the object aimed at in the construction of an efficient bunsen gas projector—an essential device to meet all conditions in operating a bunsen flame in the inverted position. Furthermore, the gauze acts as a sieve, collecting dust and lint entrained at the air-ports of the bunsen; and unless cleaned or renewed at frequent intervals, it will render the burner unfit for use.

An alternative method for overcoming the flash-back is that of adjusting the air supply at the bunsen ports so as to keep the mixture safely above the critical point at which a flash-back occurs. Inasmuch as this critical point is very near the desired mixture for perfect combustion, there is great danger of reducing the air supply to a point which will result in discharging imperfectly consumed products. Furthermore, in view of the conditions explained under the heading of combustion, it should be noted that the gradual reduction of the air-entraining capacity, due to the heat of the mixing tube in the inverted burner, will further aggravate this danger.

That the relation between the cause of the flash-back and the production of a proper mixture for perfect combustion is close, is established not only upon the theoretical consideration of the conditions involved, but by the fact that the thermostatic cone introduced into the tube for the primary purpose of automatically adjusting the combustible mixture also prevents flash-backs. Its operation is made doubly secure because its construction enables it to fulfil the function of a gauze, utilizing the principle involved in the Davy lamp, and also from the fact that it maintains the gas and air mixture throughout the entire operation of the lamp in a proportion which keeps it well within the critical limits.

In fulfilling the function of a gauze, the thermostat does not introduce any of its objectionable features, as the automatic movements of its fingers prevent it from collecting dust and lint. Furthermore, it is open during the operation of the lamp, and is removed completely from the pathway of the combustible mixture, and therefore does not offer any resistance to the passage of the gases projected from the raceway.

The bunsen tube, even in the highly developed form now used in upright burners, fails in some essential features when applied to the inverted burner. In considering this problem, it should be noted that the ordinary illuminating gases are lighter than the air and possess a marked ascending tendency even at the normal temperature. When considered in connection with the heated condition of the inverted mixing-tube between the gas orifice and the point of combustion, it is seen that this ascending tendency is thereby greatly increased.

The method used for overcoming the ascending tendency of the mixture is to project it downward with sufficient velocity to carry it to the point of combustion. The only force available for projecting the mixture downward is that obtained from the velocity of the gas at the check orifice. When it is considered that in many cases the initial gas pressure is very low—thereby greatly reducing the available force, and also that a certain portion of this force must be given to entraining the air for the mixture—it is obvious that great importance attaches to the production of a highly efficient bunsen projector. The problem of construction involved is comparable to that arising in the designing of syphons or injectors used in moving liquids. In these devices it is well known that the efficiency depends not only upon the available driving force, but also upon the dimensions of the raceways, nozzles, and ports, and the careful adjustment of their relations to each other. With gases, these relations have to be more carefully worked out than with liquids; and no device in inverted burner construction has received more careful study than the proper and efficient bunsen projector.

In the elementary forms of inverted lamps, the projector feature

is ignored and a plain tube of uniform diameter is used. While this construction serves as well as could be expected when the operating conditions are uniform and within certain favourable limits, it fails utterly to meet the requirements of universal application. To meet the conditions of varying composition and pressure, or uniformly low pressure in the gas supply, a construction is required embodying all the features of a highly efficient projector for gases. This requires an adjustable check which will give the greatest jet velocity to the gas as it is admitted to the bunsen; air-ports properly placed to give the most efficient entraining capacity; a race-way of the correct diameter and length so as to give the mixed gases the velocity necessary to carry them through the mixing-chamber and to the point of combustion; complete elimination of all features which would tend to reduce, by friction, the velocity of the projected mixture—such as gauzes, long or curved mixing-tubes, &c.

An adjustable gas check is an essential feature of an inverted burner, in order to meet the conditions of varying compositions and pressures in the gases supplied for illumination. This is especially true in the construction of a burner for universal distribution in territories using different kinds of gas—coal gas, water gas, or natural gas.

While the primary purpose of the adjustable check is to regulate the gas consumption of the burner so as to develop its highest efficiency, it will be found that the design and construction of this device has a very important bearing on the continued successful operation of the light.

The velocity of the gas as it issues from the check orifice gives the force which entrains the air at the bunsen ports, mixes this air with the gas to form the combustible mixture, and projects this mixture through the race-way and mixing-chamber to the point of combustion. This requires a construction embodying the best known principles of efficiency to obtain the maximum velocity in the jet of gas as it issues from the orifice.

The most satisfactory construction to meet the requirements of the inverted burner is the single-hole check, controlled by the sliding needle. Great care must be given to the details of construction, such as the determination of the proper size of hole to pass the required amount of gas at the minimum pressure; the thickness of the check plate; accurate drilling, to insure the discharge of the jet into the centre of the raceway; and an adjusting needle which registers perfectly, to avoid deflecting the jet and thereby destroying the force of the discharge from the orifice. The adjusting screw should be easily accessible and headed with some non-conductor of heat, to facilitate adjustment.

The protection of the fresh air supply for the inverted burner is a simple problem in mechanical construction; yet this matter has not received, in many instances, the care which its importance warrants. In the best types, a form of deflecting shield is incorporated in the general design, to serve the multiple function of protecting the fresh air supply from vitiation, deflecting the products of combustion from the fixture arms, and safeguarding the adjusting screws from undue heating.

Another very important point in construction is the method used to prevent corrosive oxidation of the burner at the point of combustion. Metal tips have been found highly unsatisfactory in operation, and experience proves that the use of a refractory magnesia tip at the point of combustion is a well-justified addition to the first cost of the burner.

Coal Tars and their Uses.—We have received from the publishers (M. Gauthier-Villars and MM. Masson et Cie., of Paris) a *brochure* on the subject of the commercial products of coal tars, and their various applications, by M. Vladimir de Vulitch, a former manager of tar distilleries. It is one of the volumes of the "Encyclopédie Scientifique des Aide-Mémoire," published under the direction of M. Léauté, a member of the Institute of France. The book contains in 168 small pages a good deal of information useful alike to producers and consumers of tar, furnished by one who has had practical experience in both capacities. There are five illustrations in the text. Then in a series of tables, the author gives the specific gravities of tars from different sources, as well as other particulars, including a bibliography and classification of the various coal tar industries. The price of the book in Paris is 2 fr. 50 c. in paper covers and 3 fr. in boards.

New Zealand Coals.—In a report made by Mr. J. S. Maclaurin to the Mines Department, New Zealand, detailed results are given of the analysis of a large number of New Zealand coals, including figures for the calorific power, as determined by a Mahler bomb calorimeter, and of the evaporative power. According to a brief notice of the report in the current number of the "Journal of the Society of Chemical Industry," the semi-anthracite coals from Paparoa are not so rich in fixed carbon as some samples of Welsh anthracite examined for comparison, but are equal to the latter in evaporative power, and contain less sulphur. The bituminous coals are useful for producing steam, for the making of gas, or for household purposes, and yield coke of good quality. Those from Paparoa, Westport, Point Elizabeth, and Brunner are somewhat better than the samples of Canadian and New South Wales coals with which they were compared. The glance coals do not in all cases yield such compact coherent coke as the bituminous coals, but are good for either steam raising or for household use. The employment of the bituminous coals and lignites for the manufacture of producer gas is also discussed.

THE TESTING OF GAS-ENGINES.

Some Practical Notes.

The members of the Junior Institution of Engineers last Thursday—meeting at the Royal United Service Institution under the chairmanship of Mr. F. R. DURHAM—had under consideration a paper by Mr. GILBERT WHALLEY, in which he gave some useful information regarding the practical testing of gas-engines. From the paper, which was of considerable length, we give the following extracts.

The author began by pointing out that, with the introduction of producer gas, power users began to realize that the gas-engine was a machine which would give reliable results for a minimum cost of working, and that therefore it was not surprising that this motor was now to be found in industrial concerns of practically every kind, and that increasing numbers were being put down every year in factories and works all over the world.

The determination of the power developed, the measurement of the quantity of fuel consumed, the checking of oil and water used, and the testing for faults in case of a breakdown or other trouble, were the principal objects of testing gas-engines. The methods adopted depend entirely upon the object of the test. For a complete test, the following points need consideration: (1) General inspection of the engine and surroundings; (2) detailed inspection and measurements of bearings, &c.; (3) verification of valve-settings and lifts; (4) determination of power available at the pulley or the fly-wheel; (5) determination of power developed as shown by the indicator; (6) determination of fuel consumption; (7) memorandum of details connected with water circulation; and (8) method of preparing report.

Dealing first with the general inspection of the engine and its surroundings, the author said the question of the site might not at first appear to be of much importance, and consequently the engine was often merely "dumped" in some out-of-the-way place that could not be used for any other purpose near the point where it was desired that the power should be applied, without much regard to the necessity of adequate space for the attendant, &c. This was a mistake. There should be a clear gangway of 3 feet right round the engine, except for the space occupied by the belt. Whenever possible, the engine should be fixed so that the belt would drive forward—that is to say, it should not be taken from the pulley back past the cylinder, but should run in the opposite direction, especially when it was necessary to place a pulley on the cam-shaft side of the engine. The foundation should consist of a bed of good concrete, the thickness of which would, of course, depend upon the nature of the ground. In bad ground, it was sometimes necessary to place substantial footings at the bottom of the foundation in order to get a firm job. The shocks to which a gas-engine was subject made it imperative that there should not be any movement at the foundation. When the engine was served by a gas-producer, the latter should not be placed in the same room, but in some fairly open and easily accessible position. There was always a certain quantity of dirt and grit inseparable from the producer; and this was liable to damage the bearings and other wearing parts of the engine.

Passing on to the second point—viz., the inspection and measurement of bearings, &c.—the author stated that the measurement of the diameter of the cylinder is a most important part of a gas-engine test, and the utmost care is needed that it should be exact. To measure it by means of a rule placed across the end of the liner is not sufficiently accurate, neither can it be properly measured from a spare piston-ring. A pair of inside calipers should be used to take the diameter; but calipers of the required size are not always available. In this case two strips of wood, each chisel-pointed at one end and a little shorter than the diameter of the cylinder, may be employed. When it is required to measure the diameter of a cylinder with great precision, the piston must be taken out and a micrometer gauge used. The vertical and horizontal diameters of the front end, of the middle, and of the back end must be taken. It is sometimes necessary to measure the piston in the same manner. The measurement of the length of stroke also requires particular care. The correct method is to set the crank horizontally on the out-centre by means of a spirit-level, and to measure the distance from the front of the piston to the front edge of the liner; then to bar the engine round until the piston is right in, and the crank level again, and again measure from the front of the piston to the front of the liner. The sum of these two dimensions will be the exact stroke. The most convenient method of ascertaining the speed in revolutions per minute is by means of the ordinary speed-counter, applied at the end of the crank or cam-shaft. When, as sometimes happens, it is not possible to get to the end of the crank-shaft, owing to keys, pulleys, or guards, and the cam-shaft is resorted to, it should be remembered that this shaft only revolves at half-speed.

In ascertaining the speed, it is advisable to count for several minutes and then take the average. When a long test is on, extending over (say) a number of hours, it is useful to employ a tachometer, which, driven from the end of the crank-shaft, shows at a glance the revolutions per minute, and denotes every variation in the speed. It is advisable, however, to verify the readings of the tachometer periodically by the ordinary methods of counting speed. For ordinary gas-engine practice the piston speed

(length of stroke in feet × revolutions per miunte × 2) is usually found to be somewhere about 600 feet per minute. It is not advisable to run at a much higher speed than this, though some of the latest engines are designed for speeds approaching 700 feet per minute, and in some cases even higher.

There are two methods of checking the valve-settings and lifts of a gas-engine—one by comparing the points of opening and closing of the valve with the position of the piston in the cylinder, and the other by comparing with the crank angles. The author's usual procedure is to combine both these methods. Dealing first with the air-valve, it is necessary to bar the engine round until the valve is just about to open. This position is found by observing that all clearance has been taken up between the cam and its roller, and also between the valve-lever and valve-stem, and that no movement of the valve has begun. At this point of opening, the piston will be found to be nearly at the back extent of its travel and on its inward stroke. The distance of the front of the piston in the liner and also the crank angle should be accurately measured. The engine should be barred until the valve has attained its maximum lift, which should be measured and the angle taken; it should then be barred round until the valve closes—care being taken to see that the clearances are still taken up, and that the valve is home on its seat. The distance the piston is out of the liner should then be measured, and the crank angle taken. The exhaust, gas, and timing valve (if any) are checked in the same way.

In the determination of the power available at the pulley or the fly-wheel, a brake may be employed, or a dynamo may be driven from the engine and the electrical horse power developed calculated. The latter method is usually found to be sufficiently correct for the majority of ordinary tests. For more accurate results, however, it is advisable to test by means of a brake; and arrangements for these tests vary according to circumstances. The most usual methods of carrying them out are by means of the Prony brake and the rope dynamometer. The former, which is the method usually employed on the Continent, consists of a pulley keyed on to the end of the crank-shaft, and clamped in between the upper and lower portions of the brake by two bolts and nuts. The upper arm of the brake is extended and loaded with weights or by a spring balance. With weights, it is necessary to arrange two stops to restrict the motion, as there is a tendency for the arm to oscillate; but with a spring balance only one stop is required and an eye-bolt to the floor. The rope dynamometer, as usually employed in this country, consists of one or more ropes placed round the circumference of the fly-wheel, and held in position by blocks of wood attached at intervals. The load is applied by hanging weights at the lower end of the rope, to the other end of which a spring balance is attached, having either a screw adjustment, or being slung over a pulley and fixed to the roof or some secure position. With this method it is advisable to anchor the rope carrying the weights, to prevent them being carried over the wheel. In place of weights, another spring balance anchored to the floor may be employed.

In making a protracted brake test, records should be taken of every change in the load and consequent variations of the speed; and, if possible, indicator diagrams should be taken at the same time. The latter are particularly necessary when running on producer gas, as the effect of every change of load and speed has a marked effect on the producer, and the diagrams will show it. For the attachment of the indicator, direct communication into some part of the combustion chamber is arranged, which is furnished with a screwed plug. On high compression engines, this plug should be made of sufficient length to occupy the whole of the passage, in order that there may be no cavities in which flame may linger, and so cause early firing of the charge. Having fitted the indicator on to the cock, it is necessary to decide as to how the reciprocating motion of the engine piston is to be communicated to the indicator drum. This is usually effected by a system of rods coupled to the piston, or by an attachment to the end of the engine crank-shaft.

As regards the actual taking of the diagrams, having placed the paper round the drum of the indicator, the cock is opened, which causes the pencil mechanism to rise and fall in accordance with the prevailing pressures inside the cylinder. The reducing gear, being connected to the drum, registers such pressures in relation to the piston movement. To determine the indicated horse power of an ordinary single-cylinder gas-engine, four factors are necessary—*i.e.*, the mean pressure developed, the length of stroke, the diameter of the cylinder, and the number of explosions per minute. The mean pressure is found, as in steam-engine practice, by dividing the diagram into tenths and measuring the mean height. The stroke is measured in feet; and the area taken is that of the sectional area of the cylinder measured in square inches. The explosions are counted either by observing the number of times the gas-valve is opened in a given time, or by listening at the end of the exhaust-pipe. The latter method is to be preferred for two reasons—first, because occasionally a charge is drawn in and not fired; secondly, in some engine-rooms the noise and clatter are so great that attention to the counting is apt to be diverted.

The author spent a little time in studying some of the variations of the cards, with the view of obtaining an explanation of their causes. In the course of his comments he pointed out that pre-ignitions are most frequently due to particles of dirt getting incandescent and firing the gases before the correct time; lubricating oil getting past the rings and carbonizing on the back of the piston and becoming incandescent; projecting corners of the engine-casting in the path of the hot gases becoming red hot; or long and narrow ports and other crevices in which flame lingers from the previous explosion, and which do not get a scavenge of air. Early firing is a trouble distinct in itself; but if the ignition be set back too far, late firing occurs. Weak mixtures, of course, diminish the output of work from the engine; and the obvious remedy is to regulate the supply of air or gas, as the case may be. The rule for this is to keep constant the ingredient under the greater pressure, and make all adjustments on the other.

The position, size, and design of exhaust silencers have a very important bearing upon the economical working of an engine. Gas-engines being rather noisy machines, by reason of the sound of the explosion being transmitted from the cylinder through the exhaust-pipe to the atmosphere, it is necessary to employ some method of deadening the sound without putting undue restriction on the exhaust. The majority of makers provide a simple cast-iron box for this purpose, with the inlet at the side and the outlet on the top; and this is usually found to do all that is necessary. The position in which this box is fitted is, however, a very important consideration. The best place for it is at the far end of the exhaust-pipe. Some makers prefer to adopt a form of exhaust silencer which consists of putting ballast in a box, and bringing the inlet of the exhaust-pipe to stand up through it; the ballast being supported upon an iron grid. The gases then pass through the ballast and away through the outlet. The ordinary type of silencer is to be preferred to this; but it sometimes happens that one is prepared to yield a little on the score of econony in order to obtain a more silent-running engine. Unless the apparatus is cleaned out frequently, the ballast becomes solidified, and prevents the free passage of the exhaust gases. The exhaust may also be effectively silenced by the injection of water into the exhaust-pipe—a method which has been found efficacious when others have failed. But it has its disadvantages. Rapid deterioration of the exhaust-pipe takes place, due to chemical action. The pipe and silencer become corroded at the corners and angles where the moisture impinges upon the metal; but it has been found possible to lengthen the life of the box by laying concrete in the corner opposite the inlet of the gases, thereby protecting the metal at this point.

Having given a description of the Mathot recorder, the author passed on to consider the determination of the fuel consumption in an engine. He showed that with engines running on producer gas, the record of fuel used is obtained by weighing each bucketful of coal or coke supplied to the producer in a given time. It is then necessary to reduce to a standard basis the figure representing the fuel consumed, by taking into account the power developed so as to bring the result to pounds of coal per B.H.P. hour. A good average figure for a well-kept engine running under fairly favourable conditions is 1¼ lbs. of anthracite per B.H.P. hour; but this must not be taken as a standard. As working conditions vary so much, it is not right to conclude that an engine's fuel consumption is excessive because it is greater than a standard figure. With town gas, the result is recorded in cubic feet per B.H.P. hour; and it is merely a matter of reading the gas-meter and comparing it with the power developed in a certain period. As a check, it is advisable to stand by the meter and count the number of explosions which occur while the index finger of the meter records (say) 10 cubic feet of gas, and then, working on the I.H.P. formula, calculate the number of cubic feet of gas per I.H.P. by substituting cubic feet of gas for explosions. After allowing for the mechanical efficiency of the engine (ratio of I.H.P. and B.H.P.), the result can be checked against figures obtained from the B.H.P. direct.

Dealing next with the subject of the circulation of water, the author pointed out that the correct temperature of the cylinder jacket has much to do with the efficient working of an engine. If the temperature be too high, the admission of the mixture is restricted; and if too low, a considerable proportion of the heat value of the explosion is lost on the cold cylinder walls. Moreover, it is not possible to obtain any benefit from the expansion of the air on cut-out strokes. A good average working temperature for the water-jacket is between 140° and 150° Fahr.; but if the engine is one of the latest high-compression type, the temperature may be advantageously dropped to 120° Fahr. The regulation of the temperature of the circulation water with the ordinary cooling-tank installation is effected by adjusting the valve on the cold-water inlet to the engine. The circulation for small to medium-sized engines is usually one or more tanks, provided for by connecting the bottom of the cylinder jacket with the bottom of the tank, and the top of the latter with the top of the jacket. The size and the number of these tanks depend upon the power of the engine and the number of its working hours. The quantity of water used should not be less than 30 gallons per B.H.P. hour. Where two or more tanks are placed in series, it is frequently found that the connecting-pipe between them is no larger than that which connects the tanks to the engine jacket. This is too small, as, the pipe being horizontal, free circulation, which is so necessary, cannot take place. With regard to the position of the tanks, the bottom of them must not be lower than the top of the cylinder.

Trouble with circulation is sometimes caused by failing to keep the jacket clean. Deposit can be readily removed by filling overnight with a solution of water and common washing soda, in the proportion of 1 lb. of soda to 100 gallons of water. If this is allowed to remain all night, on draining off in the morning and well brushing the jacket, the deposit will easily come away. The

frequency of cleaning will, of course, depend upon the hardness of the water used and the working hours of the engine, but about once a month will usually be found sufficient.

The author concluded with a few remarks on the preparation of the report.

Discussion.

The discussion on the paper dealt to a large extent with the diagrams contained in it, which we have not reproduced; and therefore there are only a few general points to which attention can be directed. The Chairman considered that the paper contained many practical notes which would be very serviceable. Mr. W. A. Tookey proposed a vote of thanks to the author. He said he had been struck with the remarks as to the noise in engine-rooms. He hoped Mr. Whalley did not mean that gas-engines were noisy, and that they clattered unduly. The latest practice of gas-engines would compare with the latest and best of steam-engine practice in this respect. In talking of the obvious remedy for weak mixtures, the author said it was to regulate the supply of gas or air, as the case might be; and the rule for this was to keep the ingredient "which is under the greater pressure constant, and make all adjustments on the other." He thought the author meant the "lower pressure." With regard to the use of water on the exhaust connections, the author spoke of the rapid deterioration of the exhaust-pipe due to chemical action; but he did not lay stress so much as he (Mr. Tookey) should have liked to see—and this was an important matter—upon the necessity for sufficient draining from the exhaust boxes where water was used. With regard to the point as to trouble with circulation failing to keep the jacket clean, the author gave them a method by which to get rid of the scale—using a solution of water and soda. It was not quite so simple a matter as that. The soda would make the water softer; but it was not a remedy for removing scale. After the solution had been allowed to stand overnight, the author stated that by well brushing the jacket next morning the deposit would easily come away. It required harder treatment than this. In inspecting gas-engines, it was a marvel to see the negligent way in which the water-cooling tanks had been arranged. He should like to emphasize the fact that the water storage should be ample, and not less attention should be paid to the size of the connections between tank and tank. They generally found three or four nice big tanks coupled together with a small pipe at the top. It was the area there upon which the rapidity of the whole circulation through the tanks really depended.

The motion was seconded by Mr. Stanley Hughes; and then Mr. G. Lygo remarked that the author had impressed the importance of the point as to the situation of the engine. He (the speaker) thought a more important matter was to have the correct angle on the belt, and at the same time to get the slack of it on the top. A question put by Mr. A. G. Evans was as to whether, in the water-cooled exhaust-box, Mr. Whalley made any increase in the outlet-pipe to let away the steam. Mr. Brewer considered that in the methods of testing the author should have dealt with the very important point as to the measurement of the clearance volume. Though the clearance volume was a somewhat complicated matter, if the piston was well oiled, and the valve-heads were well greased and so on, and filled with water, it was not difficult to get, with a fair amount of accuracy, the volume of clearance. The calibration of the instruments was another important point in making tests. He should be most careful to have his instruments calibrated both before and after testing, because in the event of any dispute the question might be raised as to whether or not the instruments were wrong. The speaker went on to refer at length to some diagrams lent by Mr. Dugald Clerk, which were used in connection with his paper before the Institution of Civil Engineers. On the point of pre-ignition, Mr. Stevens called attention to Professor Burstal's recent report (see *ante*, p. 175) and remarked that the "Premier" gas-engine used in the Professor's tests had been designed to avoid anything like pre-ignition. Mr. R. H. Parsons, among other points, commented on the one as to oil getting under the engine-beds and rotting the foundations. He said this was a trouble with all sorts of machinery; and with the oil-engine it was a good deal worse than with the gas-engine. The best way to overcome this was to have a groove cast round the bed.

The motion having been very heartily agreed to, Mr. Whalley, in his acknowledgment, replied to the points raised. As to Mr. Tookey's remark with regard to noise and clatter in engine-rooms, he (Mr. Whalley) did not think this was so much the fault of the engines as the rooms in which they were placed; and there were many rooms in which it was impossible to hear oneself speak. Mr. Tookey did not think that soda was much good for cleaning the jacket; but there was no doubt it was a good thing for preventing jackets getting dirty. Mr. Evans raised the question of the size of the exhaust-pipe if water were admitted to the exhaust to silence it. In the case he (Mr. Whalley) was thinking of, the exhaust-pipe was not enclosed at all; and the quantity of water injected was very small indeed—a mere dribble, and would not need a large pipe. For all practical purposes, he did not think there was any reason for mentioning clearance volume in testing. As to the calibration of instruments, he took it that, if responsible tests were being made, good instruments would be used, and steps would be taken to ascertain that they were correct before starting work.

THE DISTURBANCE OF STREET SURFACES.

In the course of a paper read before the last meeting of the Association of Gas and Water Engineers of Lower Saxony, which was held in Schwerin at the beginning of September, 1907, Herr Melhop, of Hamburg, described the method that has been employed in that city since the year 1901 for reducing to a minimum the expense and inconvenience resulting from the frequent partial obstruction of busy roadways for the purpose of effecting repairs or making additions to the various systems of piping that lie buried in the earth below. The author's communication was printed a few weeks back in the "Journal für Gasbeleuchtung," whence the following particulars have been derived.

In the principal streets of a large city such as Hamburg, there will be found a double line of tram-rails supported on thick concrete in the centre of the roadway, with the main sewer beneath them. Under the two sides of the carriage road may be found transmission mains for gas and water respectively, together with cables supplying current for the electric trams; while under each footpath there will be local distributing mains for gas and water, electric lighting cables, and structures containing telegraph and telephone wires. With the object of avoiding the necessity for breaking the surface of a footpath each time a fresh house connection was called for, the experiment was tried during the years 1892 and 1893, in the Kaiser Wilhelmstrasse, Hamburg, of constructing under one of the paths a subway, 10 feet wide and 5 ft. 9 in. high, one side wall of which was essentially composed of the underground front foundation walls of the houses facing the street. The main sewer was arranged underneath the subway, and in it were placed the distributing mains for gas and water and the cables for the electric light. These systems were located one above the other, close to the front walls of the adjacent premises, so that any given house could easily be connected with the electric light cables, with the gas-main, or with the water supply, by merely cutting a hole through the brickwork. On the opposite side of the subway, towards the carriage road, were supported the larger transmission water-main and certain telegraph wires belonging to the Government. The subway was nominally ventilated through the standards of the street-lamps; and it was drained by traps communicating with the sewer. The plan, however, proved unsuccessful. In the first place, the subway was much too expensive, for although it was only 500 yards long the cost of building it amounted to some £2650; in the second place, it was found troublesome to make connections with the various pipes, &c., as only artificial light was available; and in the third place, there was always the danger of explosion when the gas-main had to be drilled.

A different scheme was inaugurated during the year 1901 in Hamburg, which has proved fairly successful—as successful, perhaps, as possible under the circumstances. In the year mentioned, a standing committee was appointed composed of representatives from the Surveyor's Department, the tram companies, the police, the proprietors of the gas and the water mains, the owners of the electric light and power cables, and other interested parties. This Committee hold a meeting regularly at the beginning of each municipal financial year. The members hand in a list of the alterations, additions, and repairs to their various mains, &c., which they expect will be called for before the end of the ensuing twelve months; while the Surveyor's Department and the tram companies submit particulars of the roads whose surfaces will probably require mending—giving the approximate dates when it will be most convenient for them to do the work involved. The projects mentioned are entered in colour on a general plan of the town, so as to render it possible to see at a glance what roads will have to be opened, and by whom. The particulars relating to surface and underground work are also collected into a list showing the proposed dates for the work. From the information collated in this manner each member of the Committee is enabled to ascertain what the other members have in view, and by general agreement among themselves they are able to fix the most suitable period of the year for opening or repairing any particular street or part thereof. Manifestly the plan allows the various authorities of the city to finish new underground work in any street before the surface of the roadway or of the footpaths is repaired. Herr Melhop admits that the scheme is not perfect. It cannot always be foreseen whether any particular authority or undertaking will find it possible to do a given piece of work at a given date; the weather may be unsuitable; labour may be short; or there may be financial obstacles. Moreover, sudden fractures of a main may occur, or else some unexpected building operations may be entered upon which involve opening a street. Nevertheless the author asserts that the scheme has worked well in Hamburg, and that interference with vehicular and pedestrian traffic has been reduced by it to the lowest possible amount,

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M. Le Chatelier, of Paris, has been elected an honorary and foreign member of the Chemical Society.

At the meeting of the Institution of Civil Engineers on the 11th inst., Mr. F. J. Bancroft, B.Sc., the Water and Gas Engineer of the Hull Corporation, was transferred from the class of associate members to that of members.

A VISIT TO THE NINE ELMS GAS-WORKS.

Some Interesting Features.

The members of the London and Southern District Junior Gas Association realized a long-anticipated treat on Saturday afternoon, when, to the number of about seventy, they paid a visit to the Nine Elms Station of the Gaslight and Coke Company. So large an attendance is eloquent testimony to the keenness of the members of the Association in their search after knowledge; and it speaks equally well for the attractions of the works they were bent upon inspecting. On arrival, the party were received by the Engineer of the works (Mr. T. S. Lacey); and subsequently they were divided into three groups, and shown round—the respective guides being Mr. Lacey, Mr. John Hornby (the Assistant Engineer), and Mr. Alec. Hilson (the General Foreman).

As has been remarked, the engagement was one of some standing. In fact, it was made at the time when the experimental installation of eight vertical retorts—two settings of four retorts in each—on the Woodall-Duckham system (which was illustrated in the "JOURNAL" for July 2 last, p. 22, and has been an object of great interest to those connected with the gas profession) was in operation. During the time that has since elapsed, however, the necessary experiments to determine the behaviour of this method of carbonization have been completed; and accordingly the plant has been put out of action. There was, of course, no object whatever in keeping the settings at work after the information sought for had been obtained, as it was really too small a plant to work economically at such a station as Nine Elms, however advantageous the system may be when adopted on a larger scale. The visitors would naturally have preferred to see the verticals in action; but under the circumstances they did the next best thing—they carefully examined the settings, and listened attentively to the explanations given to them of the working.

As is, of course, well known the Nine Elms Gas-Works originally belonged to the old London Gas Company, which came into existence somewhere about 1830. The first works were erected at Vauxhall, but the lease there expired in 1865, and, as the Duchy of Cornwall refused to renew it, removal became necessary. Accordingly, the works were shifted to their present site; and in 1883 they passed into the hands of the Gaslight and Coke Company, on the amalgamation of the London Gas Company with them. The works, which are only one of many belonging to the Gaslight and Coke Company, are situated practically on the river bank; the site occupied being a little over 22 acres. Gas is distributed to the districts supplied both from Nine Elms and from holders situated a short distance away at Battersea. Nine Elms supplies Lambeth and Pimlico—Lambeth through a 36-inch main, and Pimlico through two 24-inch mains. Battersea supplies Battersea and Chelsea—Battersea through a 24-inch main, and Chelsea through a 36-inch main. Thus mains from both Nine Elms and the Battersea storage station cross the river to supply the opposite side—the two 24-inch mains for Pimlico from the former, and the 36-inch main for Chelsea from the latter. To fill these requirements, there are six holders—three at each station. The capacities of the holders at Nine Elms are 972,000, 1,814,000, and 1,792,000 cubic feet—or a total of 4,578,000 cubic feet. The capacities of the three at Battersea are 1,457,000, 1,457,000, and 2,636,000 cubic feet—or a total of 5,550,000 cubic feet. Thus there is a combined storage capacity of 10,128,000 cubic feet.

The inspection commenced with the arrangements for unloading coal, which is received at the works either in ships or barges—the latter being loaded from ships at Beckton. The ships are unloaded from the river by means of three hydraulic cranes, supplied by Messrs. Tannett Walker and Co., which work at a pressure of 1000 lbs. per square inch. The coal is lifted 80 feet from the hold of the vessel, by grabs raising a ton at a time, and placed in hoppers having a capacity of 400 tons, from which it is taken by trucks on an overhead railway to the works themselves (which are separated from the jetty by Nine Elms Lane). In this way 2000 tons of coal can be unloaded in 24 hours. The overhead railway is so arranged that the coal can be sent to store or can be supplied from it to the stages of the retort-houses. The barges are unloaded by other hydraulic cranes in the dock. While walking along the overhead railway from the river-unloading machinery across Nine Elms Lane, the members were able to get a very good idea of the works.

Here, as is the case in many places, much of the plant is old, and some of it very new. Of the many retort-houses, several are out of action, and have actually been, or are going to be, dismantled—they having been of too ancient a type to meet present-day requirements. They were mostly ground-floor houses, with open furnaces. It is, of course, in connection with these houses that the extensions referred to by Mr. Corbet Woodall, in his speech at the recent meeting of the Company, are to be carried out; but exactly what form the new installation is to take, it is not yet possible to say. The houses at present in use number three, two of which are fitted with inclined retorts, and the remaining one with horizontals.

To take the last first, the horizontal retort-house consists of 26 beds of seven's, making a total of 182 retorts, with an output per day of 2,700,000 cubic feet. The retorts are charged, and the coke is pushed out, by means of De Brouwer machinery; and attached to this house is a system of dealing with the coke which, Mr. Lacey claims, is a most simple and at the same time a very complete one. There are two horizontal hot-coke conveyors of the De Brouwer type. By these the coke is taken to the centre of the house; and it then passes up a short inclined conveyor of the same pattern, on to a long inclined tray conveyor, made by Messrs. Babcock and Wilcox, which carries the coke above a series of hoppers, over which it is distributed by a cross conveyor of the De Brouwer type. On its way to this cross conveyor, the coke is screened from the breeze; and it can be deflected to a coke-breaker, so that any portion may be broken if desired. These hoppers provide separate storage for breeze, screenings, broken coke, and large coke. At the bottom of the hoppers are suitable shoots for filling the coke into sacks; while railway trucks can also be loaded direct from the hoppers, rails connecting with the London and South-Western Railway being provided in the works for the purpose. In this way, the works are in a position to deal either with a cart trade or a railway trade; and in addition, of course, coke is furnished for use in the carburetted water-gas plant. Mr. Lacey pointed out that where coke had ultimately to be sold in sacks, this system of dealing with it saved a great deal of money; but where the coke was sold in bulk—such as in railway waggons, or, it might be, in barges—it was somewhat doubtful whether the expenditure would be justified.

In the two inclined retort-houses there are respectively 13 settings of sevens and 24 settings of eights; the daily makes being 1,400,000 and 3,000,000 cubic feet. Thus the output of coal gas per day with the modern plant that is available is about 7,000,000 cubic feet; but when all the old portions of the works have made way for the newer order of things, there will, of course, be quite a different story to tell. Incandescent gas lights are found to answer very well in certain parts of the retort-houses; but they have not been placed in the upper part of the inclined houses or on the charging side of the De Brouwer house, where there is naturally a considerable amount of dust.

In addition to the coal-gas retorts already referred to, there are three sets of Messrs. Humphreys and Glasgow's carburetted water-gas plant, each having a capacity of 1,000,000 cubic feet per day. In the ordinary course of things, however, only two of these are kept going, which brings the output of the works up to about 9,000,000 cubic feet per day. In connection with the water-gas plant, there is a special relief holder, of a capacity of 60,000 cubic feet. The total oil storage is 1,320,000 gallons. The quantity of coal used per annum is about 170,000 tons; but in addition to this, of course, there is the output of carburetted water gas to be taken into consideration.

In connection with the feeding of water-gas generators (though this is travelling away from Nine Elms, where the operation is performed in the customary manner), Mr. Lacey pointed out that at Kensal Green the Company are working one retort-house with 36 settings of eights on the inclined system with coke handling machinery; and that there is a carburetted water-gas plant there, to which the coke from the house is carried. It is taken in trucks by a small locomotive to a hydraulic lift, which conveys the trucks to an elevated hopper, where they are tipped, and the coke is screened and passed on to a conveyor. This delivers the coke into a series of hoppers with openings at the bottom, from which it can be charged, by shoots, direct into the generators. By this means, the hot coke is drawn from the retorts in the inclined retort-house, and passes, without manual handling of any kind, direct into the generator of the water-gas plant.

In the exhauster-house are to be seen three different pattern exhausters—two 225,000 cubic feet horizontal condensing Donkin's, a 100,000 cubic feet Gwynne-Beale vertical, and a 125,000 vertical Donkin's new pattern, by which the interior capacity of the drum is utilized. There are also two vertical Donkin exhausters of a capacity of 150,000 cubic feet in connection with the carburetted water-gas plant. A water supply for the works is obtained from a well 100 feet deep; about 14,000 gallons an hour being raised by a steam-pump.

Of course, oxide is used for purification; the numerous coal gas purifiers being charged with 27 inches, and those for carburetted water gas with 30 inches. In connection with the new purifying-house, there is an interesting feature; wire-rope traction being provided for elevating the oxide from the vessels to the upper floor of the building. This is greatly due to the inventive faculties of Mr. Hilson. It is a simple system of wire ropes running over pulleys, by which a bucket is lowered into the purifiers, from which it is raised full of spent material, which is emptied in a barrow, and immediately shot on the ground for revivifying. These purifiers were in the first place arranged for lime to be delivered on the top floor of the house. It was then passed into the purifiers, after being slaked, by means of shoots; and it was emptied out of the bottom of the purifiers into barges, which were in waiting on canals situated underneath the purifying-house. When oxide was substituted for lime, it was found necessary to raise the material again from the purifiers to the upper floor, which necessitated some arrangement for moving it; but the vessels are not emptied sufficiently frequently to warrant any very large expenditure on the matter. Hence the adoption of the present ingenious plan.

It may be remarked that there are three station meters for the coal gas; the capacities per hour being 120,000, 280,000, and 120,000 cubic feet. For the carburetted water gas, there is a

meter passing 150,000 cubic feet per hour. In the station-meter house, the visitors were able to ascertain the light and heat value of the gas, by consulting an open bar photometer and a Boys calorimeter. Electric motors are employed, the current for which is produced at one central station by means of a Westinghouse gas-engine. There is a duplicate plant, used to drive not only the De Brouwer stoking machinery, but also the coke handling machinery. In fact, everything in this particular house is driven by electric motors, worked by the gas-engine. "Although," remarked Mr. Lacey, "electricity is our great competitor, we have not the least objection to this competition—provided it starts with a gas-engine as the foundation."

In closing this notice of some of the outstanding features of the Nine Elms works, it may be pointed out that the public lamps in a portion of the district supplied therefrom are lighted and extinguished on the Rostin system, for which purpose an extra pressure of from 5-10ths to 15-10ths has to be put on at the requisite times. In connection with pressures, we are also told that the demand for gas for cooking on Sundays in Lambeth and Battersea is met by putting on an extra pressure of 10-10ths.

The large party were, on the completion of the inspection, invited by the Company to take tea in the men's Club-room—a spacious apartment containing, among other things, a full-sized billiard table. When they had taken their seats,

Mr. Lacey said he was pleased to see the members of the Association; and if they had in the course of the visit gathered anything likely to be useful to them in their future career, he would be amply repaid for what trouble he had taken, and the Directors of the Company would be gratified to feel that they had been able (by adding to the stock of their visitors' experience) to be of some assistance to them. He then proceeded to point out some of the features of the works.

At the conclusion of the tea,

The President (Mr. W. Upton) proposed a hearty vote of thanks to the Company for the permission they had accorded for the inspection of the works and for their hospitality, and to Mr. Lacey and his staff, who had given up a Saturday afternoon for the benefit of the Association. The large attendance showed how much the visit was appreciated; and he hoped that, for the undoubted trouble to which he had been put, the Engineer would feel recompensed by the reflection that so many members had been found ready to devote a Saturday afternoon, not to going out pleasure-making, but to returning to the business in which they were engaged all the week and trying to make the best of the opportunities so freely laid before them. It was rather novel—at any rate in his experience—to find water running so plentifully through a works as was the case at Nine Elms. It must tend greatly to facilitate transport. Another point was the good laying out of the works, and the making the best of the available space. These visits, if they thought about them, were very valuable. Individually they could not have expected to have received the attention which had been accorded to them that day; and therefore it was only by being members of the Association that they could have these opportunities laid before them. Many of those present had been most desirous of seeing the vertical retorts, which they felt were going to be a very great thing—if not to-day, then to-morrow. He personally had been pleased to see the setting; for he thought the vertical retort question was one of the most interesting ones in the gas world. That progress was being made was evident to everybody who thought for a moment. They had seen what would develop into a very great thing; and perhaps it was the precursor of something that would lead ultimately to the *desideratum* of gasifying all the hydrocarbons in the coal, which he thought was only a matter of further knowledge. These new retorts and new processes of gas making brought into the question the different quality of the gases; and this undoubtedly meant the education of the consumers and the authorities to recognize the fact. It seemed to him it was only a question of time before their gas took the same position as regarded the matter of public utility as natural gas did in many of the middle States of the United States of America; and one had to see, in order to realize, the applicability of that gas, which was sold at somewhere about the equivalent of 1s. per 1000 cubic feet. This figure, after making allowances for difference in value, was equivalent to something like 6d. per 1000 cubic feet for gas on this side. Their gas was in a state of transition; and it was interesting to see, as they had seen that day, one of the steps that promised to help in this direction. There had been a patent taken out by one of the large water-gas plant makers for a process somewhat on the lines he had referred to. Equally were change and progress being experienced on the distribution and the commercial sides. It was impossible to separate any of them; there were many questions in all three great branches.

Mr. W. J. Liberty seconded the proposition, and warmly associated himself with the President in the remarks he had made with regard to their indebtedness to Mr. Lacey and the officers; for that day, in one works, they had seen several systems—horizontal, inclined, and vertical retorts, the De Brouwer system of charging and discharging, and carburetted water-gas plant. Not long since they were, with Mr. Walter Grafton, and under his guidance, at Beckton, in Essex, to-day they found themselves at Nine Elms in Surrey, some 14 miles higher up the river, but still in the area of the Gaslight and Coke Company—with its enormous territory of 67 square miles, and a population of about 3 millions, with a consumption per mile of main of nearly 11 million cubic feet, with about 160 consumers per mile of main, with about 26 public gas-lamps per mile of main, and an annual output of about 23,000 million cubic feet; 1d. per 1000 cubic feet alone representing over £80,000 on the year's make, a sum equal to the revenue of several good-sized gas companies. It would be seen from the "income from all sources" that the Company's receipts equalled about 32s. per annum from every man, woman, and child in their district. Yet in spite of these colossal figures, the Company were still growing. They increased their output in 1907 by 2½ per cent.; and in the half year just closed they added no less than 14,736 customers to their books, while for the same short period they had an increase of 19,077 gas-stoves sold or let on hire. But it was not the enormous undertaking of the Gaslight and Coke Company in general that interested them so much that afternoon, as the Nine Elms works, which held a very unique and far from unimportant position in the cluster of works which went to make up the whole. They were unique on account of the very important part they had played in the history of the gas industry of the Metropolis; for these works really represented the old London Gas Company established in 1830, and incorporated by Act of Parliament in 1843. It was one of the thirteen Companies supplying the Metropolis, and was in the peculiar position of being astride the Thames, to put it colloquially, having one leg in Middlesex and the other in Surrey. The area on the Middlesex side was the larger, extending from Temple Bar westward *via* the Strand; while on the other side it served Vauxhall and part of Lambeth. It was really a "Competition Company" on both sides of the river, with rather cramped works at Vauxhall. It had a very trying time in its early days. In the fifties original £50 shares stood at about £2 10s., and for many years previous to 1859 did not pay any dividend. In that year, however, they managed to pay 3 per cent. Ultimately, the Company left their small works at Vauxhall, and built new ones on the river at Nine Elms. They laid mains across the river; and from that time prosperity began to show itself. Within a few years they paid 10 per cent. on the £50 shares, which were then worth £80. After 1868, when gas amalgamations were permitted by Parliament, the Gaslight and Coke Company desired to absorb the London Gas Company. Ultimately, they made an offer which the latter Company accepted; and in 1883 the amalgamation was sanctioned. He trusted that when the new retort-house was completed, Mr. Milne Watson would grant the Association the further privilege of again inspecting these very interesting works.

Mr. Walter Grafton supported the resolution, and pointed out that he made his entry into the profession at these very works. This was many years ago; and he said that a great number of changes had taken place since then. They were most indebted to Mr. Lacey and his assistants for all the trouble they had taken.

The vote having being accorded by acclamation,

Mr. Lacey acknowledged the vote, on behalf of the Company, himself, and his staff. He remarked that a great deal of what Mr. Liberty had said was perhaps not so interesting to the members of the Association as to people like himself (the speaker), who recollected all the circumstances connected with the amalgamations to which reference had been made. The Gaslight and Coke Company were doing everything they could to cheapen their gas, and the cost of manufacture had already been very considerably brought down. The solution of the problem of cheap production consisted in using good methods and having suitable units. With plant of large size, the cost of manufacture came down enormously. Things were more difficult in a works like Nine Elms, where there was an aggregation of several small retort-houses—that was to say, "small" for these days, though at one time they were regarded as large ones. Now they wanted houses which would carbonize 300 tons of coal a day, in order to get full economy out of the machinery. Working with sufficiently large units was one way in which they expected to decrease the cost of their gas; and the other way was in selling it. He thought a great deal of the more hopeful outlook of the present time was as much due to the distribution department as to the manufacturing branch. It devolved on those who were in touch with the public to see that the gas was used in such a way that consumers obtained value for their money. They did not want to dispose of so many cubic feet of an indefinite mixture; they had to sell light, or heat, or both. If it so happened that the light was a function of the heat value, then what they should do was to sell as many British thermal units as possible for a certain sum. It did not by any means necessarily follow that they would be able to sell more thermal units with a low-quality gas. The problem had not yet been solved; but there was no doubt people generally recognized they could get the most light from the incandescent burner, and that the gas which would give them the greatest light by this means would suit them best.

The visitors then took their leave, after having spent over four hours on the works.

Scottish Junior Gas Association (Western District).—We learn from the Hon. Secretary (Mr. G. Braidwood, of Dawsholm) that the members will pay a visit to the new gas-works at Kirkintilloch next Saturday. It is interesting to note, in connection with the visit, that the works were designed by the present President of the District (Mr. W. Wilson, of Falkirk), and were erected by the ex-President (James MacLeod, F.I.C., F.C.S.).

A TAR AND WATER SEPARATOR.

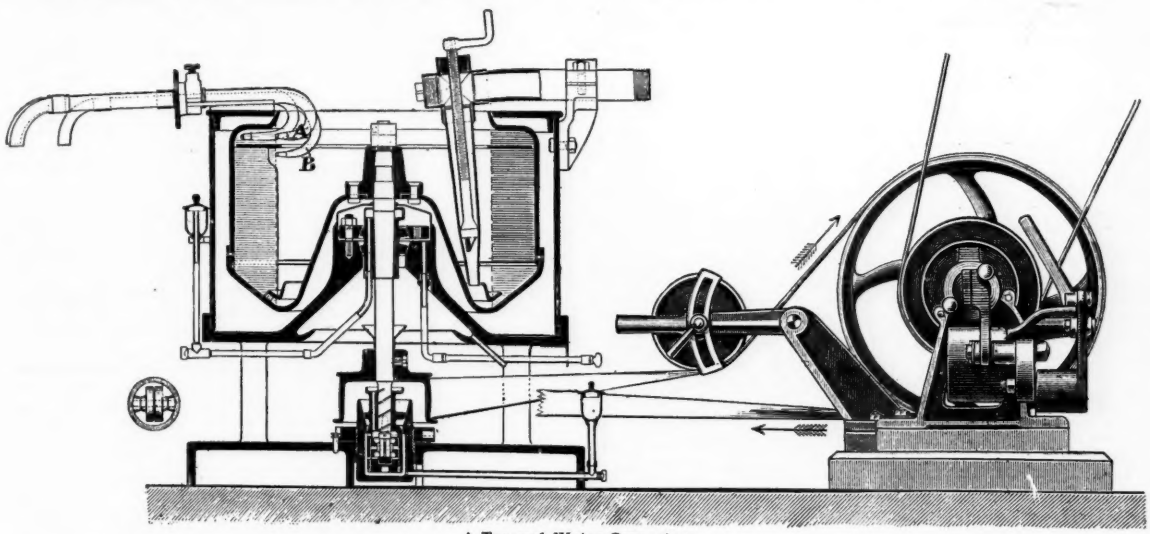
An illustration of a tar and water separator recently appeared in "Il Gaz," from which we take the following particulars.

Of the inconvenient presence of water in gas-works' tar, part can be easily separated by standing in tanks; but the remainder, being more intimately combined with the tar, is more difficult to get rid of. It can be achieved either by heat or centrifugal force. The former method requires special apparatus and special care, so as not to lose any ammonia. The latter method is more rational, easier, and more economical and practical. It is more rational because the separation of tar and water is effected quite mechanically; it is easier because the work can be proportioned to the requirements, and starting a machine is easier than heating up a large amount of tar; it is more economical because the labour involved is less with a centrifugal machine. Tar distilleries will find it profitable to pay more for centrifugally separated tar owing either to saving in carriage or fuel, or to saving in time and danger during the commencement of distillation. There will be no water with the light oils of this first period of distillation.

The plant illustrated is simple, and only requires in addition a heating vessel to raise the temperature of the tar to that desired —about 104° to 122° Fahr. The heated tar runs by the pipe V into the receptacle or basket, which quickly revolves. The denser tar is thrown towards the periphery, while the lighter water falls into the centre. A diaphragm divides the vessel into two chambers—an upper and a lower one. The tar can pass into the upper chamber through the space left between the diaphragm and the sides of the revolving vessel; while the liquor remains below. Pipes A and B draw off the tar and liquor respectively. Solid particles of tar sticking to the sides of the vessel can be taken off when cleaning once daily.

The Manager at the Bromberg (Germany) Gas-Works reports that the cost of this centrifugal separating of tar and water amounts to about ¾d. per 100 lbs. of tar treated, including labour, power, lubrication, and maintenance. The increase in the price of his tar thus freed from water varied between 6d. to 12d. per 220 lbs. There is also the advantage that such tar becomes increasingly in demand.

The apparatus illustrated is known as being on the Krayenbuhl system, and is, we believe, made by a firm at Copenhagen.



A Tar and Water Separator.

EFFECT OF COAL GAS UPON PIPE CORROSION.

A short time ago, an investigation was carried out by Mr. W. Dudley, of the Vanderbilt University, Nashville (Tenn.), to ascertain the effect of coal gas on the corrosion of wrought-iron pipe in the ground. It was undertaken in connection with the study of the conditions causing corrosion in pipes laid under the streets in the city of Nashville; and the results were presented in a paper read by Mr. Dudley at the last session of the New York Section of the American Chemical Society, and subsequently printed in the Society's "Journal."

Five samples of earth were collected, as representative of the various types of soil in which pipes are laid. No. 1 was taken from a street at the depth of the gas-pipes; No. 2 (yellow clay) from about 4 feet from the surface, on private property in the heart of the city, 50 feet from the sidewalk; No. 3 (loamy clay), from between the car tracks just under the street metal; No. 4 (clay), from a vacant plot in the northern part of the city; and No. 5 (a mixture of clay and loam), from under the car tracks in the southern part of the city. The analyses of the samples gave the following results in percentages:—

—	No. 1.	No. 2.	No. 3.	No. 4.	No. 5.
Moisture, sample air-dried	15·37	15·82	14·41	13·95	14·98
Chlorine	0·042040	0·015010	0·001800	0·000600	0·002400
Nitrogen—					
As nitrates	0 015010	0·225230	0·006000	0·003000	0·001500
As nitrites	0·00c08c	0·000002	trace	none	trace
As ammonia	0·000306	0·000165	0·000011	0·000039	0·000042
Albuminoid ammonia	0·001280	0·000052	0·000020	0·000021	0 c00021
Alkali equivalent—					
(Na_2CO_3)	0·038200	0·047800	0·032400	0·005700	0·031800
Sulphuric anhydride—					
(SO_3)	0·013400	0·019000	0·448000	0·007300	0·042400
Humus	2·040000	3·400000	2·050000	1·40	2·70

Wrought-iron pipes, 1 inch inside diameter and 10½ inches long, were carefully cleaned and freed from all oxide by immersing in a warm ammoniacal solution of ammonium citrate for 20 minutes (or longer if necessary), brushing with a stiff brush, rinsing with distilled water, and drying rapidly. The ammonium citrate solution is made by dissolving 40 grammes of citric acid in water and neutralizing with the requisite amount of ammonium hydroxide of sp. gr. 896, required by the equation: $C_6H_8O_7H_2O + 3NH_4OH$. The solution is then diluted to 460 c.c., and contains approximately 10 per cent. of the ammonium citrate. The citrate solution acts more rapidly on the iron oxide when warmed, and has very little effect on metallic iron. A clean and bright piece of iron, having a surface of about 15 square inches, was allowed to remain in the solution for 24 hours, and no effect on the surface was observed, nor was any appreciable loss of weight noted. The pipes were weighed and plugged at one end with corks driven in about ⅛-inch beyond the edge, and this space was filled with melted paraffin, to keep the moisture in the earth from getting inside.

The samples of earth were each put in a wooden box of 1 cubic foot capacity, painted inside with asphalt paint to prevent the soluble constituents of the wood from permeating the earth. The pipes were placed in an upright position in the boxes (with the closed ends down) and the samples of earth were carefully tamped around them to within 1 inch of the top. The earth in each box was to have been sprinkled daily with 50 c.c. of water, so as to maintain natural underground conditions as far as was possible; but the person in charge of this series of experiments neglected this precaution during a large part of the time. However, as each received the same treatment, the results are comparable, though they are all too low, except in the case of No. 5, which will be referred to later.

At the end of twelve months, the pipes were removed, cleaned with the citrate solution, as previously described, and weighed. The results are as follows:—

Sample of Earth.	Original Weight of Pipe. Grammes.	Final Weight of Pipe. Grammes.	Loss of Weight. Grammes.
No. 1	624·49	603·93	20·56
,, 2	652·45	638·92	13·53
,, 3	665·76	663·20	2·56
,, 4	680·81	678·30	2·51
,, 5	618·90	606·50	12·40

The results, except that for sample No. 5, show that the amount of corrosion is determined practically by the chlorine content in the earth. There is some error in the result obtained from No. 5, which the author was not able to discover; but that the result is entirely abnormal will be shown clearly later on.

The series of experiments designed to show the effects of coal gas on the corrosion of the pipe were conducted under the specified conditions in every detail. Into each box was placed an L, made of ½-inch gas-pipe, one limb passing vertically down one corner of the box and the other along the bottom to the diagonal corner. The limb along the bottom is perforated on the under side with numerous ⅛-inch holes uniformly distributed, and the

end was plugged. The gas was admitted to this pipe through a standard meter reading to 1-100th of a cubic foot.

One-half of a cubic foot of coal gas was admitted into each box daily, except Sundays, and at the same time the earth was moistened by sprinkling with 50 c.c. of water. The boxes were covered with canvas, so as to prevent the moisture from evaporating too rapidly. In the samples Nos. 2, 3, 4, and 5, two pipes were placed, and the amount of corrosion of each pair shows very good agreement. The results after twelve months are as follows:—

Sample of Earth.	Original Weight of Pipe. Grammes.	Final Weight of Pipe. Grammes.	Loss of Weight. Grammes.	Average Loss of Weight. Grammes.
No. 1	661·53	652·36	9·17	9·17
,, 2	658·30	651·77	6·53	6·34
	654·07	647·92	6·15	
,, 3	663·60	662·45	1·25	1·54
	668·71	666·88	1·83	
,, 4	665·62	964·37	1·27	1·17
	671·45	670·36	1·09	
,, 5	653·58	651·78	1·80	1·96
	663·14	661·02	2·12	

The following table shows the comparative amount of corrosion of the pipe in the earth alone and in the earth saturated with coal gas:—

Sample of Earth.	Loss of Weight in Earth Alone. Grammes.	Loss of Weight in Earth Saturated with Gas. Grammes.
No. 1	20·56	9·17
,, 2	13·53	6·34
,, 3	2·56	1·54
,, 4	2·51	1·17
,, 5	(12·40)	1·96

The effect of the gas in retarding corrosion of wrought-iron pipe is very marked, especially when we consider that the results showing the corrosion in the earth alone are all low (except No. 5, which is manifestly wrong), because of the failure to maintain the proper amount of moisture in the earth throughout the whole period of the test.

In the series of experiments with the coal gas, Sample No. 5 shows the normal amount of corrosion. In the series with the earth alone, No. 5 should have shown about 3 instead of 12·40 grammes of corrosion. The author's opinion is that No. 5 was inadvertently subjected to electrolysis, as the appearance of the pipe indicated it, and electrolytic experiments were being carried on at the same time. No. 2 shows a rather high corrosive power in both series of experiments, which is doubtless due to the abnormally high content of nitrogen as nitrates in this sample of earth. It is said that the location from which the sample was taken was formerly the site of a livery stable, which would account for the high percentage of nitrates.

Society of British Gas Industries.

The annual meeting of the Society, to be held to-morrow at the Holborn Restaurant, will be an interesting one. There is to be a preliminary business meeting; but the ordinary meeting will commence at 4.45. The retiring President, Mr. Dugald Clerk, is expected to be present. The central feature of the proceedings will be the address of the new President, Sir George Livesey. In the evening, the members will informally dine together.

Progress of Gas Supply in Belgium.

The report of the Belgian Association of Gas Managers for the year 1906-7 contains some interesting figures showing the progress of gas supply in the kingdom during the past 23 years. In 1885, the figures were: Coal carbonized, 375,000 tons; gas made, 105 million cubic metres (3708 million cubic feet); number of works, 79; workmen employed, 1550; capital engaged, 80,000,000 frs. (£3,200,000); salaries and wages paid, 1,700,000 frs. (£68,000). There were 115 communes lighted, with a total population of 2,010,000; the gas consumption per head being 52 cubic metres (1836 cubic feet). The residuals produced were: Coke, 160,000 tons; tar, 18,000 tons; sulphate of ammonia, 2250 tons. The following are the figures for 1907: Coal carbonized, 840,000 tons; gas made, 259 million cubic metres (9147 million cubic feet); number of works, 70; workmen employed, 6550; capital engaged, 148,000,000 frs. (£5,920,000); salaries and wages paid, 6,720,000 frs. (£268,800). There were 190 communes lighted, with a total population of 3,054,000; the consumption of gas per head being 85 cubic metres (3002 cubic feet). The residuals produced were: Coke, 259,000 tons; tar, 48,600 tons; and sulphate of ammonia, 5500 tons.

We regret to record the death, on the 15th inst., of Mrs. Julia Maria Paddon, the wife of Mr. John Birch Paddon, M.Inst.C.E., a Director of the Gaslight and Coke and Brighton and Hove Gas Companies; also the death of Mrs. N. E. Luff, the wife of Mr. H. J. Luff, the Secretary of the Oriental Gas Company, Limited. The last-named lady was the only surviving daughter of Mr. N. E. B. Garey, one of the Directors of the Continental Union and European Gas Companies.

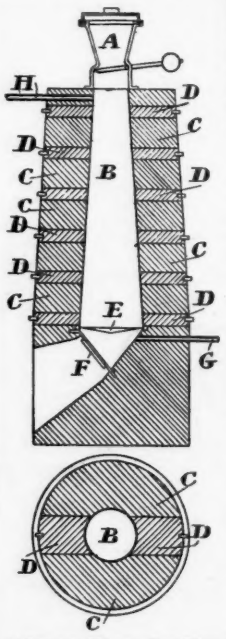
REGISTER OF PATENTS.

Manufacture of Water Gas.

FELTEN UND GUILLEAUME-LAHMEYERWERKE ACTIEN-GESELLSCHAFT, of Frankfort-on-the-Maine, Germany.

No. 2676; Feb. 2. 1907. Date claimed under International Convention, Feb. 3, 1906.

In processes of water-gas manufacture hitherto known, the patentees remark, it is found that continuous working is not possible owing to the quantity of heat required for heating and disassociating the steam; the heat having to be increased again whenever the temperature of the reducing agent sank below a certain value (about 1000° C.), thereby necessitating the interruption of the steam supply and an energetic combustion of the reducing agent by increased air supply, so as to enable the reducing agent, during the so-called period of "hot blowing," to take up a sufficient amount of heat for a further period of gas making.



A German Water-Gas Plant.

To avoid these disadvantages, various means have been proposed, whereby the air or the steam is kept at the required temperature by gas taken from the producer. It has also been proposed to use an electric furnace for the heating of the producer.

The present invention relates to the use of a modified form of electric resistance furnace as a water-gas generator; the heat generated by the electric current being utilized in raising the reducing agent (coal and the like) to the required temperature of dissociation.

A producer suitable for generating water gas in accordance with the invention is shown in vertical section and horizontal transverse section.

The reducing agent is charged into the shaft B by means of the hopper A, and constitutes a resistance mass between poles D, consisting of carbon (or cooled metal) blocks embedded in the wall C of the producer. The poles on one side may be connected (for instance) together in parallel, or the various poles can be connected in series, or, again, the lower part of the furnace may be entirely negative, while the top part is positive. Either a direct or an alternating current can be used. The charging and, generally speaking, the mechanical part of the producer may be varied; and a grate is provided at the lower part of the furnace, accessible through the door F for removing the ashes.

By means of a pipe G or the like, water, in the form of steam or of a jet, is introduced into the furnace beneath the grate E. On coming into contact with the highly-heated charge in the furnace, the water is dissociated or decomposed; the oxygen of the water combining with the carbon and the hydrogen being liberated. The water gas is taken from the upper end of the furnace by a pipe H, which delivers it to the purifying apparatus.

Inverted Incandescent Gas-Lamps.

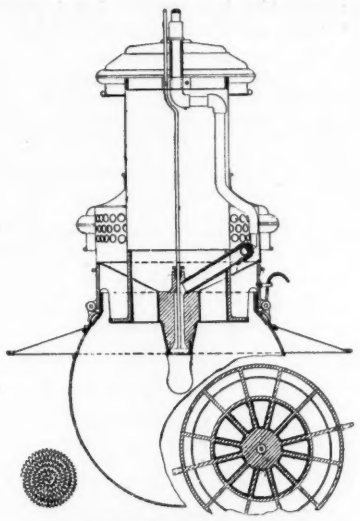
AKTIENGESELLSCHAFT FÜR SELAS-BELEUCHTUNG, of Berlin.

No. 3101; Feb. 7, 1907. Date claimed under International Convention, Feb. 10, 1906.

Under the present invention the burner-head is prevented from being burnt, and "all disadvantages resulting from the incandescence of the burner-head are removed," by forming the wall or mass of the burner-head of metal of substantial thickness, and providing conductors, consisting of arms or ribs, serving to carry away the heat from the burner-head, and effecting at the same time a cooling of the burner-head and a heating of the supplied combustion air. It has previously been proposed, the patentees mention, in order to prevent the burner-head becoming too hot locally, to make it of thick metal and to connect it to the metallic lamp body; but the "connection being direct the advantages of the construction under the present invention are not obtained."

Under the present invention, by making the metal-walls of the burner-head and of the mixing-tube thick, in combination with means for conducting away the heat, regulation of the heating effect is obtained. It is essential that a large amount of metal should be available for the quantity of heat supplied to the burner-head, and that the quantity of heat conducted to this mass of metal should be carried off in a reliable manner. By this means numerous advantages are said to be secured. The conduction of the combustion gases to the outer side of the burner-head carrying the incandescing mantle can then be carried out in such a way that the burner-head is heated to the smallest possible extent. As a result, "an extremely hot flame may be employed and a larger illuminating power may be secured at ordinary gas pressure or by means of high-pressure gas."

As shown, radial ribs proceed from the mouth of the burner-head, and are connected one with the other by means of a cylindrical portion. Further radial ribs proceed from the exterior of the cylindrical portion, and are attached one with the other by a ring connected with the lamp casing, and which, by means of a hinge or the like, carries the lamp globe. The radial ribs of the burner-head are covered with heat insulating material. In the same manner the inner face of the cylindrical part and the outer face of the burner-head which fits the conical



A Selas Inverted Burner.

mouthpiece are covered with insulating material. Preferably insulating material is likewise provided on the lower side of the burner-head. The lower end of the mixing-tube which opens into the gas supply pipe of the burner-head is likewise externally covered with insulating material.

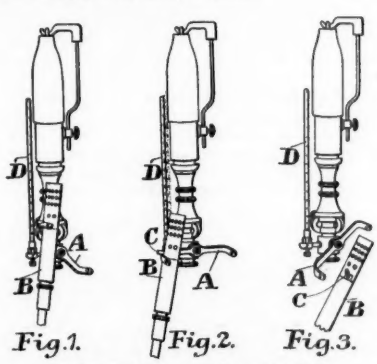
In order that small incandescing mantles may be employed, the mantle is connected with the mantle-ring provided with heat insulating material, and fixed to the mouth of the burner-head by a bayonet joint. The inner face of the ring bears against the outer face of the mouth of the burner-head in such a way that it surrounds the mouth without play. Between the mantle and the mouth a joint is thus obtained such that the combustion gases are unable to enter into the interior of the gas supply passage, but are forced to pass through the mantle and ascend on its outer side.

Lighting Incandescent Burners.

KEITH, J., of Farringdon Avenue, E.C.

No. 10,294; May 3, 1907.

This is an adaptation of the burner described in patent No. 11,644 of 1902 for use in conjunction with a lamp-lighting device in which an electric spark ignites a stream of gas that passes up a climbing bye-pass tube and so ignites the gas streaming through the main burner-tube. But in certain cases it is desired to use not an electrical ignition device, but a known form of lighted torch; and the present invention consists in providing simple means whereby, by a minimum change of parts, the burner can be arranged to be lit by a torch.



Keith's Incandescent Lamp Lighter.

Fig. 1 shows the climbing bye-pass cock in the "off" position, with the torch engaging the lever for turning on the gas. Fig. 2 shows the climbing bye-pass lighting the burner by the aid of the torch. Fig. 3 shows the cock in the full "on" position, with the bye-pass off and the torch withdrawn.

The form of the main cock and of the climbing bye-pass tube described in the earlier patent and the connection between the latter and the cock are practically unaltered. On the other hand, the cross lever A, instead of being operated by chains, is pulled down by a downward movement of a torch B, which is fitted with a projecting arm C sliding down the inclined surface of the cross-lever A, and so lights the gas in the bye-pass tube D (as shown in fig. 2) and then turns the main cock to "on" position (as at fig. 3), cutting out the bye-pass as soon as the gas coming through the burner-tube is ignited.

Gas-Fired Pottery Kilns or Ovens.

TWYFORD, T. W., of Hanley, and MOORE, T. C., of Stoke-on-Trent.

No. 13,533; June 11, 1907.

This invention has relation to pottery kilns or ovens of the regenerative gas-fired type described in patent No. 18,769 of 1906, and has for its principal objects "to increase the efficiency of such kilns or ovens and to ensure the promotion of an effective and immediate working draught on the structure being put into operation."

In the kiln or oven structure described in the former specification, the outlets of the gas and air flue-elements are arranged on opposite sides of the combustion spaces, and in such a manner that when the gas fuel is delivered into the kiln under even a low pressure, and the air is drawn in by the action of a draught only, the pressure of the incoming gas overcomes or checks the admission of air into the combustion spaces and creates back-pressure in the air-flues, which detrimentally affects the combustion of the fuel and prevents the effective working of the oven.

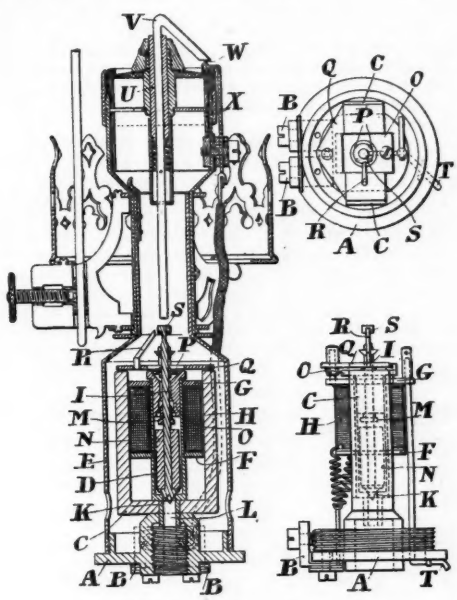
According to the present invention, these defects are entirely remedied and perfect combustion and regenerative action are ensured, while effective provision is made for the distribution of the heat generated by the combustion of the fuel to all parts of the oven, by so arranging the outlets of each set of gas and air elements with respect to the combustion spaces or chambers that the delivery of gas under pressure into the combustion space induces a positive draught in the air flues and ensures the supply of ample air for promoting thorough combustion of the fuel, "so that the maximum calorific efficiency is realized, and the goods in every part of the oven are properly fired."

Lighting Gas from a Distance.

BLASER, F., of Zürich, Switzerland.

No. 15,893; July 10, 1907. Date claimed under International Convention, July 10, 1906.

This electric gas lighter (to be operated from a distance) consists of a valve for opening and shutting off the gas supply, operated by the action of a solenoid upon a freely movable member adapted to exert a hammer-action on the valve, the movement of which valve causes a break in the electric circuit and, consequently, a spark at a point where the gas is to be ignited. The invention consists in "an improved form and disposition of the freely movable member acted upon by the solenoid and of the valve, and also in the arrangement of the circuit breaking and locking devices which co-act therewith."



Blaser's Gas-Lamp Igniter.

The bottom piece A, which is provided with a thread, carries two terminals B, a permanent steel magnet C, a pipe D, and a tube E with air-holes. The solenoid H is mounted on the thin walled pipe between two discs FG; the ends of the wires of the solenoid being connected with the two terminals insulated from the bottom piece. The spindle I in the interior of the pipe is provided with a valve cone K, which rests on the perforation L and serves as the closing part of the valve. An iron cylinder N slides on the spindle between the valve cone and a stop M. An iron core O, the plate-shaped head of which is firmly screwed on to the disc G, is mounted over the iron cylinder in the pipe D. So much free space is left between the core and cylinder that the valve cone is lifted out of the perforation when the solenoid attracts the iron cylinder N on the passage of current. The spindle I extends through the plate-shaped part of the iron core. In order to afford a passage for the gas, the diameter of the iron cylinder is smaller than the internal diameter of the pipe, and the perforation of the iron core is made larger than is necessary for the passage of the spindle. The plate of the iron core is provided with fine holes P, through which gas flows into the tube so as to form, with air, the gaseous mixture which is consumed. An armature Q is revolubly mounted on a pin on the disc G. The iron arms of the armature swing over the plate of the iron core and the poles of the permanent magnet, and are magnetized by them. The solenoid magnetizes the iron core O on the passage of current, the iron cylinder is attracted, and thereby the valve is opened. At the same time those arms of the armature which are over the dissimilar pole of the permanent magnet are attracted by the iron core. When the battery current flows through the solenoid in a reverse direction, the iron core O will change its polarity and repel the attracted arm of the armature. The armature carries a lock-piece R, which secures the cap S on the spindle, and, when the current flows in a certain direction, it prevents the valve from being closed after the circuit is broken; but on the current flowing in the reverse direction it releases the

cap, which, as a consequence, closes the valve after the breaking of the circuit.

The burner crown, in which the circuit-breaker is placed, is mounted on the tube E. The circuit-breaker comprises the guide-piece U, contact pin V, and platinum contact W. A spring presses lightly on the contact pin with the object of keeping closed the platinum contact. The piece X, insulated from the crown, carries one platinum piece of the contact, and is in conducting connection with one of the two terminals B, while V is in contact through the body of the burner with the other. The circuit-breaker is thus connected with the circuit of the solenoid. If the latter is traversed by a current, the attracted valve encounters with the cap S the contact-pin; the circuit is broken; and the spark at the platinum contact resulting from the breaking of the circuit ignites the escaping gaseous mixture.

A safety device enables (in case of need) the valve to be opened without an electric current, by means of an external lever T on the igniter, adapted to be operated by hand. The lever carries at the other end of its vertical shaft a pin, which, when the lever T is turned, is pushed beneath a cone fixed on the spindle I of the valve, so as to take up the position shown in dotted lines and open the valve.

By using the gas-pipe as a current conductor, only one conducting wire is necessary for lighting and extinguishing; and in order to reduce the number of parts to a minimum, a self-induction coil may be inserted in the circuit.

Discharging Vertical Retorts.

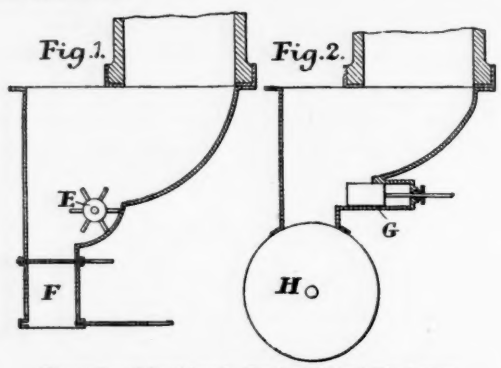
WOODALL, H. W., and DUCKHAM, A. M'D., of Bournemouth.

No. 15,053; June 29, 1907.

This invention consists in a construction whereby the free discharge of the coke from vertical retorts by gravitation "is governed by a mechanical regulating device, so situated at the bottom of an inclined surface connected with or below the retort that it is practically free from the superincumbent weight of the charge in the retort, and when actuated does not crush or put pressure on the coke."

Hitherto, as the patentees point out, the coke has been discharged from the retort by a mechanical device situated directly beneath it; but the "superincumbent weight of residue upon the device causes the crushing of the coke and general undue pressure on the several parts." It has been suggested that the retort should be provided with an inclined tubular extension through which the charge is not free to fall but is removed by the discharging device; but, they say, such a construction would be quite incapable of automatically removing coke from a vertical retort.

For the purpose of their present invention, therefore, the charge in the retort is supported on an inclined surface placed at such an angle beneath the retort that, although it supports the greater part of the weight of the charge, it does not prevent the free discharge of the coke by gravitation. At the lower end of this incline the device regulating the free discharge of the coke is fixed. It may be of known form—such as a roller, or a table upon which an arm or slide has a circular or reciprocating movement. The inclined surface may be straight or curved, and may be part of the retort or form part of a hopper attached to the retort. It should, however, be so formed and attached that the free discharge of the coke over it is not in any way impeded, and the regulating device in moving does not force the coke against any part of it or its attachments.



Woodall and Duckham's Vertical-Retort Discharger.

Fig. 1 is a vertical section through the lower end of a vertical retort and its discharging hopper constructed in accordance with the present invention; and fig. 2 is a like view showing a different form of controlling device.

In both, the retort terminates in a suitably supported iron ring, to which is attached a gas-tight hopper having a sloping side. In fig. 1 there is supported, in suitable bearings at the lower part of this side, a roller E, which may have a plain surface, but is preferably provided with arms or teeth. When the roller is at rest, it prevents the discharge of coke from the retort; but when rotated on its axis, by suitable driving mechanism, it governs the discharge in accordance with the speed of rotation. In fig. 2 there is a table G at the bottom of the sloping side, on which table a slide is adapted to be moved to and fro. When the slide is at rest, it prevents the discharge of the coke; but when it is in motion, the coke is discharged at the desired rate.

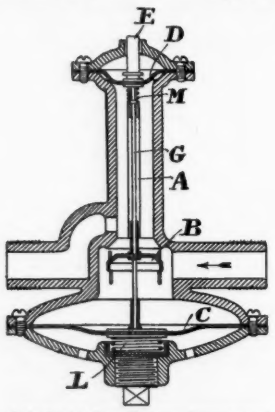
As is usual in hoppers for discharging such retorts, "there is a device for removing the coke from the hopper without appreciable loss of gas or admission of air." In fig. 1 is shown a pocket F closed by a slide at the top and another at the bottom—operated alternately, so that the "desired removal of the coke is effected." In fig. 2, the device has the form of a rotating wheel H with pockets in it, which operates in known manner. [These devices form no part of the present invention.] The discharging hopper and controlling device may be cooled either by quenching the coke in the hopper or by jacketing the hopper or a part of it, and circulating cooling fluid through the jacket.

Preventing the Escape of Gas in Conduits.

SCHULZE, W., of Detmold, Germany.

No. 20,595; Sept. 16, 1907. Date claimed under International Convention, May 29, 1907.

This invention relates to a valve for gas-conduits which, when the pressure of the gas is interrupted, automatically closes the feed-pipe, and it remains closed until it is opened again by hand. It consists of an iron valve disc (loosely journalled by means of a rod arranged in a tube on a diaphragm), which closes the opening in the valve-chamber through which the gas passes, on the diaphragm being raised, and is held in this position by a magnet, so that it is retained on its seat should the diaphragm be deflected in the downward direction, in consequence of the gas arriving again from the supply pipe.



Schulze's Gas Escape Preventer.

In the upper cylindrical part of the valve-chamber shown is arranged a horse-shoe magnet A in such a position over the seat of the iron valve B that the valve is just in its closing position when it is attracted by the magnet. The valve-plate is carried by a diaphragm C (similar to those used in dry gas-meters) held between two sheet-metal plates and carrying at the top a short tube which is sufficiently wide to allow the pin carrying the valve-plate to move in it. The upper side of the diaphragm is under the pressure of the gas in the conduit. On the under side of the diaphragm a spring L is arranged; and air can freely enter and pass out through a sufficient number of openings. In the casing, the upper cylindrical part is likewise closed by the diaphragm D. The pin E on the other side of the upper diaphragm has sufficient free play for the air to enter and pass out of the part of the casing above the diaphragm. The magnet is held in its position by a screw, and is guided by three ribs.

The operation of the valve is as follows: When it is open, the gas passes freely through it. If any "disorder" occurs in the conduit, the gas pressure suddenly ceases and the gas-lights are extinguished. The pressure on the upper side of the diaphragm ceases, while, on the other hand, the pressure of the spring L comes into play, and the diaphragm with the valve B moves towards the seat of the valve. When the disturbance in the supply is removed, the gas presses back the diaphragm C, but the valve-disc B, held by the magnet, remains on its seat and prevents gas passing through.

In order to open the valve, it is necessary to press down the pin E; and the pressure is transmitted by the rod G to the valve B, and moves it away from the magnet and back to the diaphragm. When the pressure on the pin E ceases, the rod G, together with the pin, is raised again by the spring M. If the gas is on again, the valve remains open; otherwise it closes again automatically.

APPLICATIONS FOR LETTERS PATENT.

2905.—FENN, G, and PRIEST, C. F., "Gas-fired kilns." Feb. 10.
2914.—ARNDT, M., "Pyrometer." Feb. 10.
2915.—WISEMAN, J., "Automatical ignition at predetermined times." Feb. 10.
2925.—BOUTCHER, A. G., "Gas-cooking stoves." Feb. 10.
2944.—KEITH, J. & G, "Gas and air compressors." Feb. 10.
2951.—YANKEE, A. A., "Automatic gas-governor and street-pressure changer." Feb. 10.
2960.—GUNNING, J., "Lanterns for gas." Feb. 10.
2973.—GRAETZ, M. & A., "Inverted lamps." Feb. 10.
2988.—HANDS, G., and BREEDEN, F., "Controlling the supply of gas to burners." Feb. 10.
2995.—M'LUSKY, W. B., "Air or gas preheating devices." Feb. 10.
3037.—WILLIS, P. R. J., "Lamp chimneys." A communication from J. R. M. Tisdale. Feb. 11.
3055.—WHITE, A. P., "Mantles." Feb. 11.
3093.—STAEHLE, E., "Carburetting air." Feb. 11.
3105.—GOSTLING, C. R., "Prevention of expansion or cracking of retorts, &c." Feb. 12.
3120.—SHAW, J. J., "Gas-stoves." Feb. 12.
3139.—SPREADBURY, R. J., "Gas-stoves." Feb. 12.
3159.—FREY, F., "Suspending incandescent bodies." Feb. 12.
3177.—JONES, C. J., and STILL, W. M., "Controlling the supply of gas to burners." Feb. 12.
3189.—HADLOW, F. V., "Treatment of coal for the production of artificial fuel." Feb. 13.
3433.—M'LACHLAN, R. W., "Gas-governors." Feb. 15.
3450.—SLOMNITZKIE, M., "Inverted fittings." Feb. 15.
3462.—MORTON, G. L., "Producer gas plants." Feb. 15.
3472.—AINSWORTH, F., "Preventing surreptitious tampering with gas-services." Feb. 15.
3492.—MAHL, L., "Meters." Feb. 15.

CORRESPONDENCE.

[We are not responsible for opinions expressed by Correspondents.]

The Proposed Change of Test-Burner.

SIR,—Wherein is it an error to treat the question as though the price charged to the consumer is a fixed price for a fixed quality? The price is fixed by Act of Parliament, as far as it can be done, at the cost of manufacture *plus* certain other charges. Of course, the actual price charged does vary from time to time according as the factors which go to make up this price fluctuate; but in any particular place at the present time, gas of a certain quality is being supplied at a certain price.

My point is simply that if this quality is reduced, the price should be reduced in proportion. Whether this reduction in price is masked, or entirely concealed, by an increase due to other factors, does not affect the question one way or the other; for, as you very truly say, it is quite possible the price in London would have been higher at the present time had it not been for a reduction in illuminating power.

Then apparently you also argue that because, in the case of a sliding-scale company, the greater part of any reduction in the cost of manufacture automatically goes to the consumer as a reduction in price, therefore there is no necessity to interfere with the standard. But surely, where a change is made in existing conditions, it seems only just that the consumer should be protected from possible loss before the supplier is allowed to make even a small increased dividend from the change.

Most companies who have reduced the statutory quality of their gas have also reduced the standard price, and thus at least secured that the shareholders should not benefit at the expense of the consumers. This also has its advantages in preventing a company from asking for a reduction in illuminating power unless the corresponding reduction in the cost of manufacture will justify it; and as this can only be settled by reference to local circumstances, I still think that these local circumstances should be taken into consideration.

With reference to your remark that only those who deliberately abstain from taking advantage of scientific progress in illumination are affected by differences in illuminating power, you seem to have ignored the fact that a reduction of illuminating power means also a reduction of calorific value; and therefore it affects gas used for all purposes. I have never suggested, and do not now suggest, that a reduction in candle power is a proper measure of the reduction in value to the consumer.

In conclusion, you rather suggest that I have assumed the championship of the consumers of gas who are themselves quite unconscious of any injury. I cannot lay claim to such an altruistic position. I am merely concerned, as we no doubt all are, for what I believe to be the true interests of the gas industry, which certainly must include the interests of the consumers.

ARTHUR VALON.

Caxton House, Westminster, Feb. 21, 1908.

SIR,—I was pleased to read Mr. Arthur Valon's letter in your last issue, and think his views with regard to above are correct—notwithstanding your remarks to the contrary.

You say, "Only those who deliberately abstain from taking advantage of scientific progress in illumination" are really affected by difference in illuminating power. Just so. But they have a perfect right to use the gas as they like; and seeing that, to get the same illuminating power, they would require to use more gas under the proposed change, then a corresponding reduction in price ought to be made.

There probably are many local bodies (also companies) using the new burner, where their consumers do not "feel themselves one penny the worse;" and although a considerable number of consumers in South London may have assured you that their accounts have not fluctuated in any manner to attract their attention, still that is no reason why they should be robbed. Robbery is not justified because it is not felt.

As Mr. Valon says, "the change is undoubtedly desirable," but it should be made "in such a way as to prevent any injustice being done either to the company or to the consumer."

THOMAS WALLER, Secretary
City of Durham Gas Company.

Durham, Feb. 20, 1908.

[We fail to see that Mr. Valon by his present letter advances in any way his original case for a special reduction of price to the consumer by the cumbersome method of treating each case on its merits, as against the simple method of automatic reduction which the consumer in most cases will certainly obtain as the result of the adoption of the new test-burner. There is no machinery available by which the consumer can be assured in every case—municipal supply, and supply by maximum and sliding-scale companies—of receiving a reduction of price for any reduction of illuminating power that may be (not necessarily will be) occasioned by the application of the new test-burner; and we see little reason for adopting the obscurant's method of interposing a difficulty in the path of progress over which difficulty the assurance of universal justice is palpably impossible. "Wherein," now asks Mr. Valon, "is it an error to treat the question as though the price charged to the consumer is a fixed price for a fixed quality?" And he indicates that it is not an error because "the price is fixed by Act of Parliament, as far as it can be done, at the cost of manufacture, *plus* certain other charges." The basis of this suggested fixing of price is thus about as indefinite as it well can be; and it is subject to variation immediately some factor intervenes that necessitates a rise or admits of a fall in price. How neatly the price is fixed by Parliament and the advisers of applicants to Parliament may be seen (and Mr. Valon knows it well enough) by taking the Bills and then the Acts of a few sessions, and comparing them—Bill and Act, and Act and Act—taking into consideration, too, the local circumstances which bulk so largely in our correspondent's argument. But Mr. Valon, we think, recognizes the futility of pressing forward any general claim, applying to the three classes of statutory gas purveyors, for a special reduction of price for an indefinite reduction of quality—indefinite because subject to the indefinite influences of working. He evades certain of the points raised in our comments last week, as to the host of difficulties opposed to definitely composing the comparatively small difficulty that he puts forward other than by the automatic means that are already existent. Avoiding municipal supplies and maximum-price companies, he fastens on to sliding-scale companies; and he pleads for the protection of the consumer "from possible loss before the supplier is allowed to make even a small increased dividend from the change." From the sliding-scale supplier, Mr. Valon, animated by an exquisite sense of justice, would tear every shred of advantage; but he does not tell us that which would give point to his argument, how he would deal with other suppliers working under different conditions. But the sliding-scale, after all, is not positive in its operation as far as the shareholders are concerned. It is a means whereby the maximum benefit is assured to the consumer, and a very limited maximum benefit to the shareholder if he can get it—that is to say, if the funds will allow, which they do not always. From any economies achieved, consumers get all but, according to circumstances, (say) one-sixth or one-eighth part that goes to the shareholder. We are, therefore, among those who cannot see (bearing in mind the municipal and maximum-price difficulties) any necessity for undertaking any herculean task, or causing any general upheaval, for the purpose of adjusting an infinitesimal difference. Mr. Valon would spend an immense amount of money in inquiring into the merits of every individual case, to secure what?—something that will automatically and fairly adjust itself in a short time. The consumer under a sliding-scale company does not hurt; but verily our correspondent (like Mr. Waller, who talks of "robbery") is hard on the shareholder. We can now deal with Mr. Valon and Mr. Waller together. There is great anxiety displayed for the people who use flat-flame burners. Mr. Waller remarks that a man who buys gas can use the gas as he likes. Just so. He can let it go free in the open air so long as he does not occasion nuisance to his neighbours. But twenty years after the incandescent mantle has been brought to practical perfection, those luminous flame users should, and do in many towns where there are progressive gas undertakings, represent a very small percentage consumption; and surely we cannot for ever and ever go on legislating for consumers who do not make the best use of their gas, nor should they be allowed to stand in the way of legislation that will be of general advantage to those who use their gas wisely and well. To those flat-flame users who, according to our correspondents, would suffer so unreasonably by the adoption of the new test-burner, the gas supplier offers a burner that will give him eight times more illuminating power per cubic foot of gas consumed than he is getting at the present time. But then we are accused by Mr. Valon of ignoring the fact that "a reduction of illuminating power means also a reduction of calorific value; and therefore it affects gas used for all purposes." Here Mr. Valon would project the question into another morass. We are not going to deny that, as a general principle, a reduction of illuminating power under precisely uniform conditions of production (which uniformity is not found to be continuous even in any one gas-works) would be followed by a reduction in calorific power; but that principle receives some rough shocks from the calorimeter in the hands of competent observers in the same works, and in different works where different conditions and methods of production prevail. How those who are so sensitive over this so-called justice are going to regulate these matters, we will leave them to tell without any surmise on our part. Take a few samples of calorific value tests (made officially or by men whose competence will not be questioned) that have been published in the "JOURNAL," without going into any private observations:—

London Official Tests—

Coal gas	15·6 c.p.	..	141.4 calories
,, ...	16·1 c.p.	..	133·5 ,,
,, with c.w.g. . .	17·5 c.p.	..	134·6 ,,
,, ,, . .	17·0 c.p.	..	139·9 ,,

Average of a number of tests: Coal gas, 134½ calories per cubic foot; mixed coal gas and water gas of higher candle power, 134 calories.

Vertical Retorts—

Bournemouth (Woodall and Duckham)	14·20 c.p.	(coal gas)	546 B.Th.U.
Oberspree (Körting) . .	10·80 c.p.	(with steam)	546 ,,
Nine Elms (Lacey) . .	16·4 c.p.	(coal gas)	543 ,,
,, ...	15·83 c.p.	,,	535 ,,

[All the above tests were made with the "Metropolitan" No. 2 burner.]

The old accepted ratio between illuminating power and calorific

power as Mr. Leicester Greville has said, certainly requires a big revision under the change in processes of production. But Mr. Valon says: "I have never suggested, and do not now suggest, that a reduction in candle power is a *proper* measure of the reduction in value to the consumer." We agree; but then what is? Consider the candle powers and the calorific values set out above, and then reply to the question. A basis is not to be found for doing justice as between municipal, maximum-price, and sliding-scale suppliers; and a safe basis cannot be found for measuring the reduction in value to the consumer. Then why this bother? The gas industry is in a state of transition; and nothing should be done to hamper progress—and the "true interests" of the industry—by raising matters of relatively small moment that all perceptive minds recognize will in a short time adjust themselves, without any sacrifice of the interests of the consumer. When Mr. Valon or Mr. Waller or anyone else can show us any general public complaints from disinterested ones among the myriads of consumers in the Metropolitan area, using gas as they are for all sorts of purposes, arising from the application of the "Metropolitan" No. 2 burner, or can produce any evidence of the interests of the industry or of gas consumers having been affected as a result then we shall be pleased to pursue the discussion of this subject. We do not think that we have attributed to Mr. Valon any "altruistic" attitude—seeing that, by the most careful scrutiny of the position, we entirely fail to see where he is sacrificing himself in any way in the interests of others. All that was suggested was that he was crying out on behalf of consumers before hundreds of thousands of consumers whose gas is to-day tested by the new burner in London and in the Provinces—both in municipal and company areas—have found any occasion to cry out on their own account. If they are unconscious of change, they are not being injured; if they are unconscious of change too, they are not conscious of any increase in their accounts.—ED. J.G.L.]

Automatic Public Lighting at Tipton.

SIR,—As we have now had time to thoroughly test the merits of the automatic lighting and extinguishing apparatus which is in use throughout this parish, I have no doubt your readers will be interested to hear our further experience.* We are saving over £200 per annum in consequence of its adoption, having been able to dispense with the services of three lamp attendants, representing £170 per annum. In addition to this there is a big reduction in the number of mantles, chimneys, and rods used, of which I give particulars below. The percentage of failures is very small; and when these do occur, they are usually owing to the bye-pass having blown out. We light or extinguish at any time that may be necessary, and at present from midnight to 5 a.m. put out alternate lamps. Altogether the system is giving very great satisfaction here. The following figures show the number of mantles, &c., used annually before the adoption of automatic lighting, and since it has been completed on the ordinary street-lamps (442):—

Year.	Mantles.	Rods.	Glasses.
1904	6806 ..	858 ..	2891
1905	7195 ..	689 ..	4255
1907	**4508** ..	**333** ..	**2248**

Tipton, Feb. 19, 1908. SIDNEY O. STEPHENSON.

Gas and Electricity in West Ham.

SIR,—Referring to my letter in your issue of the 11th inst., and your criticism of it, there seems to be some doubt in the editorial mind as to the reliability of my figures. The points which really control the case appear to me to be as follows:—

1.—That the meter is correct.
2.—The consumer is using electric light to the same extent as he previously used his gas.
3.—He has as much light as, or more than, before.
4.—His electricity bill is half his gas bill.

Surely this dispenses with further argument, and makes it plain that electricity is cheaper than gas on the quarter's bill alone, not to mention the ever-present and large economies in doctors' and decorators' bills, which are coincident with the use of electricity against gas for lighting purposes. Nor is this an isolated case—it is almost a typical one; and I shall be pleased to send you not another, but almost as many examples as you choose to ask for.

It is well to note that the figure which you give on p. 342, of 3½ cubic feet per hour for gas consumption for a 64-candle power burner, is not obtained in usual practice, for our observations show it to be at least 5 cubic feet per hour on an average. Again, 64 is merely a theoretical figure, for, what with varying pressure, badly adjusted mantles, dirty burners, and keeping mantles too long, the average works out at not more than 30 to 40. I do not express an opinion as to whether this high consumption is necessary, or the low candle power the best that can be got; but they are the figures against which we have to compete, and represent the actual and not the theoretical position. The same applies in the case of the kettle. The cost for gas is far away ahead of the figure you give; and further, at 1d. per unit, one unit will boil 12 pints of water and not 4¾ pints.

Mr. Money's statement as to electricity being everywhere is not false as you think, for at 1d. per unit we can compete in price for ordinary factory use with any known power agent where the fuel is to be paid for at market rates. The proof of this statement is that eighteen months ago we laid a cable to Silvertown, which district holds several large factories managed by as experienced and smart business men as can be found in the country, and there is now but a small percentage of these factories not taking a supply from us; and with these few we are now in negotiation. The same applies to Stratford, only more so; showing that Mr. Money's statement is substantially correct. I will not be so unkind as to give you the number of gas-engines we have displaced by motors.

H. H. HOLMES,
Sales Manager, West Ham Corporation Electric Supply.
Stratford, E., Feb. 17, 1908.

[Mr. Holmes's letter did not come to hand till after the "JOURNAL" had gone to press last week. Hence the delay in publication. Our correspondent is uncharitable in not allowing us the right to back our opinions by the results of a large experience in gas lighting and experience with up-to-date private installations of electricity. Due to that experience, there is certainly a great deal of doubt in the editorial mind as to the reliability of Mr. Holmes's figures, and as to householders for any length of time consenting to live under the strait-laced conditions of artificial illumination projected for them in Mr. Holmes's eccentric prescription for burners and hours of lighting as published a fortnight since. We still hold, on personal experience, that the consumer in question was not doing the best he could have done with his gas if he is getting "as much or more light" now with his Osram lamps, and more particularly seeing that "his electricity bill is half his gas bill." There is some error here which can be set right if Mr. Holmes can induce his chief, Mr. Seabrook (an amusing letter from whom to a local paper is dealt with in our "Electricity Supply Memoranda" this week), to offer to accept the Welsbach Company's challenge to a cost trial with equal illumination and hours of use. That would "dispense with further argument" better than the postulatory statements as to "as much or more light" being obtained with Osram lamps at "half the cost of gas." Again as to the consumption of an ordinary incandescent burner, a light can be obtained (ask Mr. James Swinburne) of 64 candles with a consumption of 3½ cubic feet of gas per hour; and there is no reason why this should not be realized in ordinary practice. Of course, if consumers will not give a little attention (it pays very well to do it) to their burners and replace fractured mantles, they will get a reduced illuminating power; that is their own fault, not that of the gas company. As to variation of pressure, there is a parliamentary point below which pressure must not go; and the variation of pressure is not great in any one particular locality. But Mr. Holmes should not talk of the infinitesimal effects of variations of ordinary gas pressures upon incandescent mantles, when some recent tests published in the "Electrician" show that 1 per cent. variation in voltage will produce 4 per cent. change in the candle power of metallic filaments and 6 per cent. change with carbon filaments. Another observer states that 2 per cent. drop in pressure will cause a carbon filament light to lose 18·5 per cent. of its light. Will Mr. Holmes lend us a sample of the ordinary incandescent burner which consumes "5 cubic feet on the average," so that we can submit it to examination and consumption and illuminating power tests; for it seems to be a burner against which to warn consumers, if our correspondent is correct? As to the claim of 18 candles per cubic foot of gas consumed, we will go higher still, and say that, with the best forms of regulated bijou inverted lights, 25 candles per cubic foot of gas per hour can be realized. The guarded statement of our correspondent is admirable that "I do not express an opinion as to whether this high consumption [the 5 cubic feet] is necessary, or the low candle power [30 to 40] is the best that can be got; but they are the figures against which we have to compete." Coming to the kettle-and-pint-of-water point, our correspondent is not candid. In the article to which he refers, 2d. per unit was taken as the price, and 4¾ pints of water, it was stated, could be boiled for a penny-worth of the twopenny electricity. So that we are not far in disagreement in this regard with Mr. Holmes, nor with figures published some time ago, in which it was stated by an electrical advocate that a quart of water could be raised from 62° to 212° Fahr. by the expenditure of one-fourth to one-sixth of a unit of electricity. Using a much befurred iron kettle and a clean aluminium one, Mr. W. J. Atkinson Butterfield, M.A., F.I.C., has found that a quart of water can be raised to from 62° to 212° Fahr. by the expenditure under those respective vessels of 1·72 and 1·51 cubic feet of gas, which, at 2s. 11d. per 1000 cubic feet, would cost 0·06d. and 0·053d. There must be something sadly wrong with the calorific power of the 2s. 9d. West Ham gas if it will not do all that was claimed for it in the article in question. As to the last part of our correspondent's letter, in which support is given to the assertion that electricity is "everywhere," the Board of Trade returns showing that the gas industry continues to dilate year by year must be grotesquely false; and as to the remainder of the paragraph, Mr. Holmes may be referred to Mr. Snell's paper before the Institution of Electrical Engineers, some figures from which were quoted in our editorial columns on Jan. 28 (p. 215) and at the

* It may be remembered that Mr. Stephenson read a paper on this subject at the meeting of the Midland Association about this time last year. See "JOURNAL," Vol. XCVII., p. 604.

foot of the first column on p. 219. In the latter, there is the assertion that for power purposes the West Ham Corporation are selling electricity at below the correct figure. If 1·340d. per unit is the correct one for power, 1d. is certainly not the correct one either for power or heating. However, that is a matter for Mr. Holmes to discuss with Mr. Snell; we merely point it out as touching upon the argument in the letter. Our correspondent need not study our feelings, if he has any longing to give the number of town-gas engines displaced in West Ham by electricity; it would not have been to the credit of the West Ham Electricity Department if they had not succeeded in displacing some. To an extent, displacement does as a rule follow the introduction of an alternative.—ED. J.G.L.]

The Reserved Price under the Auction Clauses.

SIR,—In the issue of the "JOURNAL" for Feb. 11, you write on the above matter: "We believe the Commercial Company were the first to secure the abolition of the restriction in their Act of 1902."

It is a matter of little importance which company was the first to secure this great practical advantage in gas administration; but, for the sake of historical accuracy, may I put forward a claim for the Reading Gas Company, as being, I think, entitled to the honour?

There is no doubt that several gas companies obtained Acts in 1902 with the "not below par" clause omitted. The Reading Gas Company were in Parliament in that year. In October, 1901, we received the first draft of our Bill, from which the "not below par" clause was omitted. On March 7, 1902, the Bill was before Sir Saville Crossley's Committee. We had some smart skirmishes with the Corporation of Reading, who objected to some of the clauses, but no exception was taken to the omission of the "not below par" clause.

When the Bill reached the House of Lords, Counsel to the then Lord Chairman, the Earl of Morley, drew his Lordship's attention to the omission of this particular clause, as being contrary to precedent. When in committee, the Lord Chairman required the attendance of representatives of the Gas Company, to submit reasons for the omission of the usual "par" issue clause from the Bill. At the request of my co-Directors, I attended before Earl Morley, and gave the necessary explanations, with which he was quite satisfied.

I have the confident impression from that conference, that this new departure from the customary auction clauses had not previously been before his Lordship. Lord Morley's consent to the omission of the clause from our Bill is noted in the issue of the "JOURNAL" for March 18, 1902.

Our Bill received the Royal Assent on June 23, 1902. I think the Commercial Company's Bill did not reach this final stage till several weeks later.

The really important point for gas companies is well put by Mr. Ellis in his letter to you in November last. When before Parliament, they should insist on the omission of the "not below par" clause from their Bills. There is not the slightest reason why gas companies should condemn themselves to chains they need not wear.

JOHN EGGINTON.

Goring, Oxon., Feb. 20, 1908.

Dust Particles in Air.

SIR,—I wish to correct a statement appearing on p. 424 of the "JOURNAL" for the 5th of November. The error appears in Mr. J. H. Brearley's address on "Gas Hygiene and Ventilation," in which there is a table having a note to the effect that the particles of dust in air near the ceiling, numbering 88,346,000, are "equal to the population of Great Britain," and that the particles in air over a gas-burner, numbering 489,000,000, are "equal to the population of the whole world." The population of Great Britain—*i.e.*, the United Kingdom—at the last census was only 41,607,000, and the population of the world is estimated at 1,550,000,000; so you will see that both figures are a long way out. The figures given for the United Kingdom would about equal the total population of the United States of America and Canada, or France and Germany combined; while those given for the world are more than the population of the British Empire, and would about equal it and the United States of America together: British Empire, over 400,000,000; United States of America, over 80,000,000—total, 480,000,000.

L. F. D. CARTER.

Grafton (N.S.W.) Lighting Company, Dec. 10, 1907.

A Rat Causes Darkness.—According to a Berlin Correspondent, the town of Charlottenburg was suddenly plunged into darkness at a late hour last Tuesday evening by the failure of the electric current. Three railway stations, several theatres, and innumerable restaurants were affected by the sudden deprivation, and some extraordinary scenes of confusion were revealed by the light of hastily-sought lamps and candles. The stoppage, which lasted half an hour, was caused by a rat, which had jumped in among the bus-bars at the power station. This is the second occasion on which Charlottenburg has been deprived of light by such a cause.

Cagliari Gas and Water Company, Limited.—At the ordinary general meeting of this Company on the 3rd prox., the Directors will report that the income on revenue account for the past year amounts to £30,840, and the expenditure, including the transfer of £200 to the sinking fund, to £15,745; leaving a profit of £15,095. The total sum available for distribution, including the balance of £6820 brought forward, is £21,916, out of which an interim dividend at the rate of 6 per cent. per annum was paid for the six months ending the 30th of June. The Directors recommend a dividend at the rate of 8 per cent. per annum for the half year ending Dec. 31 (making 7 per cent. for the year), together with a bonus of 5s. per share. These payments will come to £12,375. They propose to credit the reserve fund with £1000, and there will be carried forward a balance of £8541.

PARLIAMENTARY INTELLIGENCE.

HOUSE OF LORDS.

Petitions have been presented against the following Bills:—

Ammanford Urban District Council Water Bill, by the Carmarthen County Council, the Swansea Corporation, the Swansea Rural District Council, the Burry Port Urban District Council, and the Llanelly Urban and Rural District Councils.

Audenshaw and Saddleworth Urban District Councils Bill, by the Ashton-under-Lyne, Stalybridge, and Dukinfield (District) Joint Water-Works Committee.

Bognor Gaslight and Coke Company Bill, by the Bognor Urban District Council.

Briton Ferry Urban District Council Bill, by the Aberavon and Neath Corporations.

Keighley Corporation Bill, by the Haworth Urban District Council.

Llanelly Gas Bill, by the Llanelly Urban District Council.

Llanelly and Burry Port Water Board Bill, by the Carmarthen County Council, the Ammanford and Llanelly Urban District Councils, the Swansea Corporation, the Swansea Rural District Council, and the Llandilofawr Rural District Council.

Monmouthshire County Council Bill, by the Abergavenny Corporation, the Pontypool, Panteg, and Llantarnam Urban District Councils, and the Pontypool Rural District Council.

Pontypridd Water Bill, by the Aberdare and Aberaman Consumers' Gas Company, the Caerphilly, Mountain Ash, Pontypridd, and Rhondda Urban District Councils, and the Neath Rural District Council.

Ravensthorpe Urban District Council Bill, by the Dewsbury Corporation.

Rhymney and Aber Valleys Gas and Water Bill, by the Monmouthshire County Council, the Caerphilly Urban District Council, the Llandaff and Dinas Powis Rural District Council, and the Gelligaer and Rhigos Rural District Council.

Skegness Urban District Council Bill, by the Skegness Water Company.

Swansea Valley Gas Bill, by the Pontardawe Rural District Council.

HOUSE OF COMMONS.

Thursday, Feb. 20.

COAL MINES (EIGHT HOURS) BILL.

Mr. GLADSTONE asked leave to introduce a Bill "to amend the Coal Mines Regulation Acts, 1887 to 1905, for the purpose of limiting hours of work below ground." In doing so, he said he quite agreed that his right hon. friend opposite (Mr. Akers-Douglas) was most reasonable in asking that he should make a statement on the Bill. He thought it would be sufficient, however, if he explained the operation of the first clause, which contained the operative provisions to secure the eight-hour day for miners. By this clause, the inspector was to approve in each colliery the time reasonably required for purposes of lowering or raising the men. Assuming that the time fixed at a particular colliery was half-an-hour, and that the men started work at 6 a.m., they would all have to be down by 6.30 a.m. Eight hours was the time prescribed by the Bill for a man to be underground, and therefore it followed that the first man up must be above ground at 2 p.m., and the last at 2.30 p.m. Thus, if the men ascended in the precise order of their descent, each one would actually be underground, from bank to bank, for eight hours. Obviously, however, it would be impossible to secure the ascent in the same order as the descent, and therefore they did not get an actual eight hours, but an average of eight hours for each man below ground. Important clauses, which allowed overtime of one hour per day on 60 days in the year, and authorized the Government, by Order in Council, to suspend the operation of the Act in case of grave emergency, were introduced into the Bill, as well as other clauses which were in that of last year. The Bill was one of great importance in its bearing on the coal industry. It would be, and it must be, closely scrutinized in its passage through Parliament, in its relation to the commercial and domestic interests of the users of coal, both large and small. It had been the subject, for many years past, of much discussion. But those who had differed strongly were not now far apart; and he was sanguine enough to hope and believe that a satisfactory basis of agreement, without disadvantage to the consumers, would be found in the Bill for the lasting benefit of the great population of miners in this country.

Mr. L. HARDY entered a protest against the introduction of the Bill; but, seeing that it had been discussed on so many occasions, he would not divide the House upon it. The discussions on private members' Bills dealing with this subject which had taken place in former years were duels between two classes of the persons interested; and while the representatives of an important section of the miners were opposed to the principle of the Bill, they were regarded as academic debates. But the present Bill had the sanction of the Government; and for the first time the House was asked to limit adult labour. The miners were a powerful body, who had been able to secure advance after advance in wages; and they were able by their own effort to obtain an alteration in the hours of labour if they desired to do so. Therefore the Bill was unnecessary, and if it was passed it would have a great effect upon the commerce and industry of the country. He protested against the introduction of this novel legislation.

Leave having been given, the Bill was brought in and read the first time; the second reading being put down for last night. Mr. F. E. Smith promptly gave notice that when this stage was reached he would move—"That this House declines to proceed further with a measure which, by further increasing the cost of coal, will cripple the great productive industries of the country, increase still further the

pressure of unemployment, and produce distress and hardship among the poorest classes in the community." Mr. Lupton (Sleaford) gave notice to move the rejection of the Bill.

On Tuesday, in answer to a question put to him by Mr. Ashton, the Member for Luton, Mr. Lloyd-George said he hoped to introduce a Bill to amend the Electric Lighting Acts as soon as there seemed to be a reasonable prospect of time being available for its discussion.

A Bill has been re-introduced by Mr. Leif Jones, "to empower local authorities to acquire water rights otherwise than by agreement." It stands for second reading on the 2nd prox.

The following further progress has been made with Bills:—

Bills read a second time and committed: Garw and Ogmore Gas Bill, Holderness Water Bill, Swinton and Mexbrough Gas Bill, Wolverhampton Corporation Bill.

The Conway and Colwyn Bay Joint Water Board Bill, Glyncorrwg Urban District Council Bill, Lincoln Corporation Bill, and West Bridgford Urban District Council Water Bill have been referred to a Select Committee, consisting of Mr. Mooney (Chairman), Dr. V. H. Rutherford, Mr. Gibbs, and Mr. H. De R. Walker; to meet on Thursday.

The Rochdale Corporation Bill, Slough Urban District Water Bill, and Stockport Corporation Bill have been referred to a Select Committee, consisting of Sir Henry Kimber (Chairman), Mr. J. Williams, Mr. Hart-Davies, and Mr. Cecil Harmsworth; to meet on Thursday, March 5.

The Kirkby-in-Ashfield Urban District Council have presented a petition against the Lincoln Corporation Bill.

LEGAL INTELLIGENCE.

DISPOSING OF WATER FROM GASHOLDER TANKS UNDER EXTENSION.

More Suggestions for Dealing with the Water.

The long-drawn-out case in which the Lewisham Borough Council and the South Suburban Gas Company have been concerned, was brought to an end before Mr. CECIL CHAPMAN, at the Tower Bridge Police Court, last Thursday. The previous proceedings were reported in the "JOURNAL" for July 23 and 30 last year and the 21st ult. The facts of the case were briefly summarized in the opening paragraph of the report published on the last-named date.

Mr. A. H. POYSER appeared for the Borough Council; Sir CHARLES MATHEWS represented the Company.

Mr. *E. H. Stevenson* was the engineering witness called by Mr. POYSER on this occasion. He stated that he had read the evidence already given, as published in the "JOURNAL;" and he believed the report was fairly full. He knew the works of the Company, and the two gasholders in question. They had been used for the storage of an admixture of carburetted water gas and coal gas. In storing gas in gasholders, certain constituents of the gas were absorbed by the water, which became more or less foul. He believed that the water in holder tanks became more foul where carburetted water gas was used than where coal gas was used alone. The film that collected on the water made the latter more offensive than it would be without it; the witnesses for the Company had, in fact, stated that it had a very pungent smell. The film would remain on the water until it evaporated.

His WORSHIP: Does it evaporate?

Witness: The greater part of it would evaporate if it were exposed to the open air.

Examination continued: Asked whether the evaporated gas would spread, witness said he took it that it would. There was always a smell from gas-works; they could not be managed without some smell. But when they got a smell added to the ordinary one, he could well understand it would be appreciable in the neighbourhood. Personally he knew nothing whatever about the thickness of the film in this particular case; but such films often ran to ¼ inch thick, and even to a greater thickness in gasholders where carburetted water gas was used. If he were going to empty the water from the tank of a holder in which carburetted water gas had been stored, he should first of all take off the film; and he should do this by pumping with a floating suction, so that the film would all first flow into the suction. By moving the suction about, he thought he could clear off practically all the film.

By his WORSHIP: These moving suctions were well known in water-works. He had put them in water-works where the water had to be softened. They were always put into water-softening tanks where the water was softened by lime, because after the water and the lime water mixed, the lime in solution was carried down, and the top water became clear before the bottom. In that case the mouth of the suction was placed just below the water-level; but in the case of a gasholder tank he should use a long, flat sort of mouth, and keep the under lip of the suction below the water-level, so that the film would flow in.

Examination continued: It was not really necessary to take off the film, because it could have been flooded with light petroleum oil, which would have kept off all smell, as was done in the case of a gasholder in America. In that instance it was a balance holder, or the first holder into which the raw water-gas passed; and the water became very foul indeed. He thought that either of these two processes would have been feasible at the South Suburban Gas-Works. Neither of these things having been done, there would be a smell the whole time the water was being pumped out. When the water was pumped out, part of the film would still rest on the bottom of the tank. Asked whether, if the sediment at the bottom of the tank was removed by a steam-ejector, that would increase the smell, he answered that, if the water were discharged into the atmosphere, it would increase the smell, because the steam used in the steam-ejector would heat up the water, and cause smell to be given off more rapidly than if the water were cool. There was a way in which the drawing off of the water could have been avoided almost altogether. Some 3 or 4 feet would have had to be drawn off; but a small quantity like that could have been dealt with by discharging it into a bed of ashes, which would have largely purified the water. Under the peculiar circumstances of these two holders, he should certainly have made the addition above the water; and he should not have cleared the water out of the tank. It would be remembered that the Company originally only intended to enlarge one of the holders; but when they pumped the water out of the one tank, they found the water percolating through from the other tank, and then they had also to pump that one out. The two tanks were approximately 20 feet apart; and, in his opinion, it was not safe to take the water out of tanks when they were so close as that. He would have constructed the addition to the holders just in the same way as holders were built over tanks filled with water. Regarding the enlargement or additions to the rest-stones to accommodate the fourth lift, he would have done that work by divers. He had had work carried out by divers in the sea at quite as great depth as the water in these tanks.

By his WORSHIP: He had never heard of divers being used in the tank of a gasholder. A diver, however, could work in foul water, because he was quite excluded from it.

In cross-examination, witness admitted that he was dependent for the thickness of the film on the top of the water upon the evidence of those who saw it. With regard to the leakage from one tank to the other, the existence of a clay soil between the tanks would minimize danger; but with tanks so close as in this case, he, as an engineer, would not advise emptying one of them.

Sir CHARLES MATHEWS: Do I understand that you would have left the whole volume of water exposed to the air?

Witness: If there were any effluvia from it, I would have put oil on to it.

Can you tell me of any single case where, in any gas-works, these methods of yours have been employed?—At Chester, Pennsylvania.

Any cases in this country?—No; the question is a somewhat modern one.

Holders are being altered in this country to this day, but not by the American method?—No.

So that we have to go to the United States to get a solitary instance of the employment of your method?—Yes, of the use of oil upon holder tank water to stop the effluvia; but it is a common scientific fact that oil put upon any heavier substance will stop evaporation.

And so common as to be absolutely without employment in this country?—It is so common it is often used in the case of chemicals.

Sir CHARLES MATHEWS: So common as that; I see!

Cross-examination continued: Generally speaking, the alterations in this instance were done in the manner usually adopted in this country, by emptying the tanks; but where there was a film on the water, he had known that film to be taken off first. That was at York, and during last year. His brother was then the Engineer of the York Gas Company. Excepting in that isolated case, he had never known a gasholder tank emptied in any other manner than that employed in the case of the defendants' holders. He could not say tanks were always emptied without complaint. He knew of another case in York, before his brother went there, in which there was great complaint; and it was in consequence of this, that his brother was so careful to take the oil off the water before he pumped it away. Replying to the inquiry whether it was not usual for the water to be taken out for the purpose of putting in additional rest-stones, witness said that it entirely depended upon the situation of the holder whether or not the water should be taken out. The ordinary way was to empty the tank before the work was done. He had emptied two or three tanks in his time; and the smell had always been very bad. Therefore, it depended upon the situation of the holder whether, from the nuisance point of view, one should empty the tank or not. He agreed that, at the date when this work was done, they had never heard of anybody doing anything else but emptying tanks when they wanted to put in additional rest-stones; and up to that time a temporary nuisance was looked upon as inevitable—just as it was in America until the engineer in charge of the works he had named thought he could do better. The employment of a diver in a gasholder tank had never arisen in his experience.

Sir CHARLES MATHEWS: Not even in America?

Witness: No, Sir.

Re-examined: Methods of doing work were not less practicable because they came from America. They generally found new ideas came from there.

Sir CHARLES MATHEWS: What a shameful admission!

Witness: We are conservative in this country in engineering.

Re-examination continued: With regard to practicable means, there were means known to engineering which, if applied to this particular work, would prevent a nuisance. Because divers had not been used before, it did not follow that they were impracticable for gasholder tank work. It would be quite a practicable way of dealing with rest-stones. The oil covering for the film was well known in dealing with chemicals.

His WORSHIP: It seems a reasonable thing to do when you know it. Has it been used for the purpose in chemical work in analogous positions?

Witness: It has been used in laboratories more than anywhere else.

His WORSHIP: That is on a small scale; you are dealing there with a sort of washhand basin.

Mr. POYSER: What strikes me about this is, supposing gas-works always stick to the old methods, there will never be any improvement in these matters; and we shall never have any advance at all.

His WORSHIP: That is not the point. Mr. Stevenson has said that none of these improvements had been thought of by people whose minds have been directed to this work at the date the alterations in this case were carried out. It might be that they would not now be unreasonable things to employ.

Mr. POYSER: We are dealing, Sir, with the word "practicable."

Sir *George Livesey*, examined by Sir CHARLES MATHEWS, stated that he was within a few months of sixty years in having been in absolute contact with gas-works operations. The alterations to the holder tanks in question were determined upon by the Board of the Company last year; but the Board had talked over them the year before. On the Board they had gentlemen of great experience in these matters. The Deputy-Chairman (Mr. Robert Morton) had been engaged in gas manufacture since 1860; and Mr. Charles Hunt since 1865, in very large works. The Board considered very seriously the proximity of the two holders. He personally had had a large experience in dealing with gas-holders; he did not suppose any man had had so much to do with them as he had. The South Metropolitan Company's works were situated on gravel; and it was there a very serious thing to take the water out of the gasholder tanks, because, the gravel being pervious, the water would rise. But the tanks at Sydenham were in solid clay. There was another civil engineer on the Board; so that with Mr. Shoubridge there were five of them to consider this question of enlarging the two holders. They discussed it repeatedly at the Board, to consider whether it would be advisable to extend one gasholder at a time. There was a distance of 22 feet between the tanks, and they expected there was solid clay between them. They came to the conclusion they might risk enlarging one at a time, because it was a serious matter to have to alter the two in one year, and they thought there would only be time to do one. But when they had lowered the water about 20 feet in the larger tank—perhaps a little more—the water in the tank of the smaller holder began to go down. A leakage of this kind would often stop itself. They waited to see if this would; but it did not do so. They therefore felt it necessary to deal with the smaller holder at the same time, because it was impossible to empty the large one without damaging the smaller one. He thought the explanation of the leakage was that, when the excavation for the larger tank was made, the clay at the narrowest point between the two tanks shifted a little, and the strata got broken. That made a passage for the water to flow through. The methods adopted in dealing with the work were, so far as he knew, those that had always been adopted in this country. He would not say it would have been impossible to do the work without taking out the water; but it would have been impossible to do the work in the time without removing the water, coupled to which there would have been considerable danger to the men. Therefore they followed what had been the universal practice of pumping out the water. If such work could be done without removing the water, he would have adopted the plan at the South Metropolitan works, because it was a dangerous thing taking the water out of the tanks there, as they generally leaked in filling again. If there had been any large gasholder altered without pumping out the water (they were built sometimes with the water in), he believed he would have heard of it. He thought it was probable that most of the holders built with water in them had been at the South Metropolitan works, because they were obliged to put the water in the tanks to prevent uprising, but never had one of the holders been enlarged without taking out the water. If the smell complained of came from the water in the tank, it would have been a great deal worse if the water had been left there, because the top of the water would have been exposed, instead of for three weeks, for something like six months. There was no film apparent on the water when he saw it. But he was not going to say there was not a film of the thickness (say) of a sheet of notepaper. In his opinion, covering the film with oil would have made matters worse. The gasholder that Mr. Stevenson had spoken of was not a supply holder; it was simply a small one into which water gas was passed, and the oil from the water gas would be deposited in it. They had not used water gas for a long time at the South Suburban works. Great care was exercised that there should be no exposure of water drawn from the tanks. They had had a large experience of this, and knew that, when tank water was disturbed, if it flowed through an open channel, there would be fumes given off; and therefore they were particular in keeping it in closed pipes until it reached the sewer. That was done in this case. [Sir George, by the aid of a model of a telescopic gasholder, elucidated many of the points raised during the case; and his Worship intimated that the explanation with the model had made more intelligible to his mind matters of some complexity.] Proceeding, Sir George said he would not say that certain of the methods suggested by Mr. Stevenson could not be carried out. There would be difficulties; but he had never before that day heard of the proposals in connection with the enlarging of gasholders. The methods that were employed were those universally adopted in gas-works up to the date of the alterations.

Cross-examined: He had never known of nuisance to, or complaint from, the public arising from the tank water itself; the nuisance arose from putting the water into the sewers. They found this at the South Metropolitan works in connection with the Kennington holders. Close by there were houses; and there was no complaint of smell from the tank water. But on putting the water into the sewers, complaints came right away from Brixton. At the South Metropolitan works, they did not use carburetted water gas. From his experience, it seemed that, when the tank water was put into the sewers, the two smells combined, and made something that was very nasty and disagreeable. But the whole question was whether they were to get rid of the water slowly or quickly. They could not put the water into the river; and they must put the water somewhere. In the American holder to which Mr. Stevenson had referred, being one into which carburetted water gas was sent before being mixed with the coal gas, a large amount of oil would collect on the surface of the tank water; but in their own case there was no appreciable film. On the Board of the South Metropolitan Company they could aggregate about 200 years gas-works' experience, and considerable experience in emptying holder tanks. In that great experience, the difficulty had always been the getting rid of the water. They had every desire to avoid nuisance. They could not put the water on the land, they could not put it in the river, then where were they to put it?

There was a little discussion between his Worship and Counsel on the question of costs, in the course of which

His WORSHIP remarked that he thought the defendants had discharged the onus upon them of showing him that they did do all they could, and all that was known, at the date at which they were put into this difficulty. That was his opinion. On the other hand, he was also of opinion that the Borough Council were quite right in initiating proceedings to ascertain whether the defendants had done that, and they were quite right in protecting the inhabitants from what was for a time an unmitigated nuisance. The question arose, Was it a preventable nuisance? It was found by a period of watching that the nuisance did not arise from the ordinary processes of manufacture, but from some temporary cause. It then rested with the Borough Council as to whether they would go on with the proceedings, and incur further costs, to show whether or not the defendants had used all known means of preventing the temporary nuisance.

There was further discussion between his Worship and Mr. Poyser on the question of costs, after which

His WORSHIP said this question of costs was not always a satisfactory thing to decide—that was to say, in a case which ended in a question of costs only. In substance, what he thought in this case was that the Borough Council were bound to take proceedings against the Gas Company for what he believed was a greater nuisance than had been admitted by the defendants. That was one portion of the case in which he differed from Sir George Livesey and other witnesses, because he (his Worship) did think there was a greater nuisance arising from the exposure of the water in the tanks than had been admitted by defendants. He did not think the nuisance came from the manholes of the sewers. This opinion he formed by the evidence he heard. He therefore considered the nuisance, as it was certified to the Borough Council, was such as to compel them to take action. That being so, they did what was right in the first instance. Hearing the evidence was quite enough as to the actual nuisance for the time being. Then the question arose as to whether it was due to improper manufacture of gas or to some improper manipulation of their gas-works, and whether it was likely to recur. The parties then separated to see whether it would recur. He certainly took it that the adjournment was for the purpose of giving the Borough Council opportunity to consider whether it was necessary to proceed further against the defendants. In his judgment, it was perfectly within the power of the Council to have ascertained without coming into Court all that the defendants had been able to put before him as a Magistrate as to the methods they had adopted; and it was in the power of the Council to take expert opinion outside a Court of Justice to criticize those methods, and to find out whether there was any other means which defendants ought to have adopted, and failed so to do. But the experts the Council had called—very clever men, and distinguished men—had really done nothing to assist the case against the defendants, except theoretically; and he did not think this was good enough in dealing with work conducted, as this was conducted, in a practical way, considering not only the question of annoyance to the neighbours, but also the cost, time occupied, and the danger to the men employed in carrying out the work. In reference to all of which, in his opinion, the defendants had acted quite reasonably, and had acted with due consideration of their duties to the public. He did not, however, think that all this could have been ascertained until after the adjournment. His difficulty was that he thought the plaintiffs ought to have their costs up to the adjournment, and the defendants their costs after the adjournment. How best to regulate this in a Court like that in a proper way, he did not quite know. It seemed to him that—although it was not always a reasonable thing to do—this was one of those cases in which there being two hearings for which the defendants ought to pay, and two for which the plaintiffs ought to pay, the right thing to do was to dismiss the case without costs.

Mr. POYSER: We had to have these expert witnesses to deal with these matters.

His WORSHIP: But you have put the defendants to considerable cost in dealing with them. Up to the point of the adjournment the Council did everything that was right; and to that date the Council would have had their costs. But afterwards you put the other people to heavy expenses; and I think they should balance each other. The case is dismissed, without costs.

THE PROMOTION OF THE KENT COUNTY GAS COMPANY.

Close of the Bankruptcy Court Proceedings.

As briefly described in the "JOURNAL" last Tuesday, a sitting was held at the London Bankruptcy Court on the preceding day, before Mr. Registrar HOOD, for the re-examination of Messrs. Harry Warwick Gyde, Walter Darby, and Charles Archer, whose evidence as to the promotion and failure of the Kent County Gas Company, Limited, was reported in our columns on the 11th inst. (p. 364).

Mr. H. BROUGHAM, the Senior Official Receiver, attended from the Board of Trade; Mr. C. H. THORPE (instructed by Messrs. Corbould-Ellis and Mitchell) appeared for creditors and shareholders; and Mr. RITTER and Mr. EDMONDSON (instructed by Messrs. Dade and Co.) represented the witnesses.

Mr. *Archer* was first questioned by Mr. EDMONDSON, and stated that he joined the Board of Directors by invitation. Before he did so, he knew his intended co-Directors. It was common knowledge that they were men of experience in the working of gas companies.

The REGISTRAR: Common knowledge?

Mr. EDMONDSON: Yes; I think that was conceded by my learned friend on the last occasion.

Mr. THORPE: I certainly did not concede it.

Mr. EDMONDSON: At any rate, it was stated that Mr. Burgess had knowledge of the working of gas companies.

Further replying to Mr. EDMONDSON, witness said the first three Directors (Messrs. Darwin, Burgess, and himself) carefully considered the prospectus, which was supported by an engineer's report. He relied upon the prospectus, and believed that everything therein contained was substantially true. He also relied upon the technical knowledge of Mr. Darby and Mr. Burgess. At the last sitting he said he would not personally have given £21,000 for the works if he had seen them; but this only related to the works.

Mr. EDMONDSON: Would you have given that amount for the whole concern, according to the reports contained in the prospectus, the Engineer's report, and acting upon the advice of your co-Directors?

Witness: I should say "yes" to that.

Your faith in the concern was based entirely upon the prospectus and the prospects of future trading?—Yes.

Did you ever, after receiving a telegram withdrawing an application for shares in the Company, allot such shares?—No. On the other hand, we opened several letters of allotment that had been made out and did not send them.

Then I may take it that the whole of your acts in this matter were based upon information received which you believed to be absolutely true and reliable?—Yes, certainly.

Mr. *Darby* was next examined by Mr. RITTER, and stated that he introduced one or two Directors to the London and Westminster Bank, where an account was opened with the Company. The allotment forms were printed in the ordinary manner, and the names had to be filled in. The cheques received by the vendors in payment of the purchase price were drawn, according to a well-known custom, to a number; but the counterfoils always showed for what purpose the money was drawn. Witness was positive that on receipt of any letter or telegram withdrawing an application for shares, the allotment letter would be cancelled, and would not be posted. He attended to the financial branch of the business, and his firm supplied furnished offices, secretary, and clerks to the Company.

Mr. *Gyde* was also re-examined by Mr. RITTER. He said he did not read through the agreements of March and April, 1906, and had no idea of what they really contained. When at the last sitting he made reference to the Mitcham Gas-Works, he did so with a view to showing that these works were started many years ago by the Lord of the Manor and one or two others with a working capital of £300, and they were now worth at least £350,000. This gave him an idea, through life, how profitable gas-works could become, though they were only started in a very small way. It had been suggested that the requisitions for the gas had not been sent in by neighbours. This, in the witness's view, was immaterial. Their object was to feel the pulse of the neighbourhood, in order to see whether the inhabitants would take gas in the event of the mains being laid past their doors. The majority of the people interviewed agreed to take gas—either by their signature of the requisition or a verbal promise. It was not until his attention was drawn to it by the Official Receiver that witness discovered that one of the sheets was filled in by one person. The mention of Tunbridge Wells, Canterbury, and other large towns was not by way of comparison with Goudhurst, but merely to show that gas companies in the county were, or could be, made into profitable concerns. He believed these works were capable of considerable development, because there were large mansions in the neighbourhood. It was further pointed out by Mr. Hyde, from whom they acquired the property, that a gentleman opposite the works was paying them £100 or more a year for gas, notwithstanding the fact that he was also using electric light. Also that there were many such mansions in the neighbourhood. Under these circumstances, he regarded the figure of 50 millions as being a reasonable estimate for the output of gas when the works had been developed as set forth in the prospectus. It was his firm opinion that if the Company had not been wrecked, the Directors would have had no difficulty in obtaining the requisite working capital. Witness took up the project first as a private "spec.," but changed his mind because the developments were too large for his firm to carry out. Questioned with regard to the suggestion that no adjoining land was available, witness said he was advised that it would be judicious to form a triangle—to have the old works at one corner, and erect two new works at the other corners; thus embodying the neighbourhood where the gas was wanted. The present works were on the top of a steep hill, which caused a difficulty in sending out the gas. There was plenty of land to be obtained in the neighbourhood which could be acquired under the triangle scheme. Questioned regarding Mr. S. B. Darwin's connection with the Company, witness said he obtained that gentleman's assistance by means of an advertisement. They went very carefully through the prospectus, and he never knew a man to raise more points in the way of inquiry than did Mr. Darwin while acting as a Director. Witness could not say whether that gentleman went down to look at the property, but he heard him express his intention of so doing. Mr. Darwin also told witness that he would like to send the prospectus to shareholders of his late Company, and he not only supplied a list of names for the purpose, but suggested that a letter should be enclosed with the prospectus. The reason why Mr. Darwin contemplated resigning his directorship was because certain papers in the first instance held him out to be a very strong man, and, in fact, praised up the Company because he was on the Board. Mr. Darwin did not like that; and when subsequently the comments upon the Company were just the reverse, he did not like that either, and intimated that he wished to resign his post. Witness pointed out that this was not the time for a Director to resign, seeing that he was quite satisfied with the prospectus, and that it would not be fair to his co-Directors. Mr. Darwin asked for four days in which to think the matter over. This was agreed to; and they did not hear from Mr. Darwin again until he wrote to the newspapers sending in his resignation. Mr. Darwin did not send in his resignation to the Company for some months afterwards. Witness quite agreed with Mr. Darby's evidence regarding the allotment letters. They were not filled up prior to the meeting of May 19, 1906, because, in fact, they only came from the bank a few minutes before the meeting was opened.

Mr. BROUGHAM said it was quite clear that letters and telegrams were received on that day, but it would be difficult to prove the hour at which they were delivered.

The REGISTRAR asked whether the witness remembered various names that had been brought before the notice of the Court in relation to the letters and telegrams in question; but the answer was in the negative.

Further replying to Mr. RITTER, witness said he was strongly of opinion that the Directors could get as much working capital as they required as the development went on. Asked why it was that he thought £21,000 a reasonable price to ask for the property, he said it was reasonable in view of the expenditure they had to incur, and of the prospects and earnings likely to be derived from the flotation of the Company. He added that he was one of the first to point out that certain developments could be made; but seeing that the Company had not the opportunity of carrying them out, it was impossible to say whether the result would have been good, bad, or indifferent. He still believed that it would have been good. In adopting the system of making cheques payable to numbers, the Directors followed the example of thousands of other people and companies. The particulars were absolutely and fully set out in the counterfoils. In paying only 5s. per share on allotment of their shares while 10s. was paid by the general public, his firm were acting strictly in accordance with the Memorandum and Articles of Association; and they paid long before they were called upon to do by the terms of the prospectus. He personally did not attach much importance to the statement that a profit of £300 was made at the works during the year prior to the formation of the Company, because it was to the development of the works and business that they looked for the future of the Company.

The inquiry was then closed.

The Liquidation of Messrs. Wright and Butler, Limited.

In the Companies Court at the High Court of Justice last Tuesday, Mr. Justice Neville heard an appeal from his decision on a summons in chambers, asking that the proceedings in the liquidation of this Company should be transferred to the Birmingham County Court, on the ground that all the parties interested were resident in Birmingham or the neighbourhood. Mr. Galbraith, who appeared in support of the application, said it appeared from the papers and accounts that the only chance of the general creditors getting anything was by proceedings to make the Directors liable for about £1800, which it was alleged they had paid by way of fraudulent preference. If the proceedings were carried on in Birmingham, the creditors would find the funds necessary, as they would be moderate in amount; but the expense would be prohibitory if everything had to be done in London. After some discussion, Mr. George Lawrence, for the Official Receiver, not objecting, his Lordship made the order transferring the proceedings to the Birmingham County Court.

Fraudulent Use of Gas at Bristol.

At the Bristol Police Court last Wednesday, William Crick was summoned for stealing 10,000 cubic feet of gas, value £1, the property of the Bristol Gas Company. It was explained that defendant was a restaurant keeper in Redcross Street. On the 8th inst., a visit was paid to the premises, for the purpose of inspecting defendant's meter and fittings. Defendant was asked whether he had a stove downstairs, and said he had not; but on going down into the cellar, a gas-ring used for cooking purposes and a gas-bracket were discovered. Defendant was asked how he accounted for this; and his reply was that his brother, who was the previous tenant, had made the connection because the supply was not satisfactory. Examination revealed the fact that the cellar supply did not pass through the meter, but was obtained by tapping an old service-pipe left in the wall, which at one time supplied the premises from Asher Lane and not, as now, from Redcross Street. Defendant admitted the offence, and expressed sorrow for what he had done. On his behalf, Mr. Watts said the old pipe in the wall was discovered by a relative of defendant's; and being curious he tested it, and found the pipe yielded gas. Had the Gas Company used what he thought would have been proper supervision by removing this pipe when the new meter was put in, temptation would not have been put in the way of the defendant. His client was quite ready to compensate the Company. For the prosecution, Mr. Weatherly pointed out that the defendant was a poor man, or the Company might have summoned for penalties to the extent of £5 a day during his tenancy. The pipe was not exposed in the way suggested. The Company did not care for compensation in a case of larceny of this kind; they would rather have the decision of the Court. Defendant had been in the Metropolitan Police Force for eleven years, and should have known better. The Magistrates said they were not certain that defendant ought not to go to prison straight away; but they would fine him the small penalty of £5, with £3 3s. costs, or six week' hard labour. Defendant was ordered to remain in custody until the money was paid.

Electric Cables and Street Explosions.—At Bury last Tuesday evening, two street-boxes connected with one of the Corporation electricity mains were blown out, and heavy paving-stones were thrown into the air. Nearly all the lights in the theatre went out; and the performance was continued in semi-darkness. Other public buildings fed from this main were also plunged in darkness. The previous Saturday afternoon, a similar explosion occurred in Sheffield, preceded, we are told, by a "peculiar, pungent odour of frizzling pitch." It is a wonderful thing that in neither case did any personal injury result from the flying through the air of the heavy stones.

Newport Gas-Works Benefit Society.—Alderman T. Canning, the Engineer and Manager of the Newport (Mon.) Gas Company, presided at the recent annual dinner of the Company's Benefit Society, which was attended by the Mayor (Mr. T. Parry), the High Sheriff of Monmouthshire (Colonel C. T. Wallis), and the Secretary of the Company (Mr. T. H. Hazell). The toast of "The Chairman and Board of Directors of the Gas Company" was proposed by Mr. W. Morgan, who stated that they encouraged the workmen to become shareholders in the undertaking, and pointed out that the Thrift Society was an admirable institution. Alderman Howell proposed "Success to the Gas-Works Benefit Society," and congratulated the members upon the healthy condition of the fund. After allowing £188 for sick pay, there was £269 in hand. They also contributed nearly £50 to the Hospital. The Vice-Chairman (Mr. J. Whitefield) responded; and Mr. T. Donovan remarked that the balance-sheet was an excellent one. The healths of the Chairman and Mr. Hazell were duly honoured.

MISCELLANEOUS NEWS.

SOUTH SUBURBAN GAS COMPANY.

The Half-Yearly General Meeting of this Company was held last Friday, at De Keyser's Royal Hotel, Victoria Embankment, E.C.—Sir GEORGE LIVESEY in the chair.

The SECRETARY (Mr. Chas. M. Ohren) read the notice convening the meeting; and the Directors' report and the accounts were taken as read.

PROSPECTIVE REDUCTION IN PRICE—TREND OF COAL PRICES.

The CHAIRMAN said it was his duty to move the adoption of the report and accounts. There was not very much upon which to comment in the report. The working of the half year had been satisfactory. There was a surplus, instead of a deficit as twelve months ago. But the uncertainties of the future rendered it inadvisable for the Directors to reduce the price of gas from Christmas. They were not at all sure how things were going; but he thought he might say now that from the end of the current half year—that was, from June—there was no doubt whatever that the price of gas would be reduced, and the proprietors would return to their 5½ per cent. dividend. Since Christmas they had seen that a great change was possible in regard to the coal market. The Company, when Newcastle coal was dear, and having rather an expensive short bit of railway carriage from Erith to the works for Newcastle coal, found it to their advantage to go to Yorkshire for coal; and for the last year or two they had been to that source for their supplies. But taking Newcastle gas coal as the standard for gas coal, about this time last year that coal was bought under contract at 11s. 6d. per ton; but the price went up considerably, and as high as 14s. 6d. per ton was, he believed, given. The fact was that gas undertakings particularly were under the necessity last year of providing for contingencies. There was a talk during the early part of the year, and until the autumn, of a railway strike; and therefore it was absolutely necessary for them to make themselves secure for the winter. Consequently, gas companies, everywhere, he believed, laid in much larger stocks of coal in the summer time than they had been in the habit of doing. The result was that at Newcastle the demand for coal tended to put up the price to as much as 14s. to 14s. 6d. per ton f.o.b. in the Tyne. But very few gas companies paid this price under contract; most of the contracts being made at a considerably lower price. Of course, prices having gone up so sharply under exceptional circumstances, were likely to tumble down rapidly; and that was what had taken place. Now Newcastle coal had been bought in quantities—not under contract for a year—by important gas companies at 10s. a ton, against 11s. 6d. at this time last year. The question gas people had now to determine was if the price had touched bottom. Certainly he did not think it had, considering that 10s. a ton was 33 per cent. more than it had been in recent years. Last year it was 11s. 6d., the year before 8s. 6d., and three years ago 7s. 6d.; and that was more than it used to be. But taking 7s. 6d. as the basis, 10s. was 33 per cent. advance; and he did not, therefore, regard the 10s. as the bottom price. He thought it might be looked upon as the beginning of a return to reasonable prices. Nobody could say that 10s. per ton for gas coal was the proper price with trade in the condition it was in this year. There would no doubt be a difficulty in getting it down; and if gas companies were in a hurry—and there was no reason why they should be in a hurry—to make their contracts, they would play into the hands of people who wanted to keep up the price of coal. There was no fear of a shortage of coal, and most gas undertakings had much larger stocks now than they usually had at this time of the year through making provision for contingencies. Therefore their position was a peculiarly strong one. He hoped there would be no fear on the part of any gas people as to obtaining their coal at reasonable prices. Rushing in now at 10s. would be, in his opinion, a mistake; for there was every reason to think the price would go a good deal lower.

THE EIGHT-HOURS MINERS BILL.

There was another matter in connection with coal. The Home Secretary (Mr. Gladstone) had reintroduced the Miners' Eight Hours Bill—the same Bill that was introduced last session. There had in this matter been a great amount of pressure brought to bear on Parliament by the miners; and when it was remembered that the Miners' Federation included all the miners in the United Kingdom, except Durham and Northumberland, and probably mustered among them half-a-million votes, it was easy to understand why members of Parliament were so tender in dealing with these people. The miners were demanding this eight-hours day. He might say this for the coal owners, that they had protested against it; and they had done this in the interest of the coal users, because if the coal owners had to pay more for getting coal, they would transfer the extra cost to the buyer. The owners had seen Mr. Gladstone, and had represented to him that, in accordance with the finding of the Departmental Committee, there was little doubt that, if the Bill was passed, it would considerably increase the cost of coal. It would at first produce a shortage; and it would also considerably increase the cost of coal getting, and so necessarily raise the price. In fact, he heard within the last week that the Yorkshire coal owners had decided to put a clause in their contracts to this effect, that, in the event of the Bill passing, an additional 1s. 6d. per ton should be paid for coal, with an option to the buyers to cancel their contracts. So that, if the Company made a contract with any of these gentlemen, there would probably be this clause in it; and they would, in the event of the Bill passing, have the option of throwing up the contract, and getting coal where they could, or pay the extra 1s. 6d. This showed the owners' view of the matter; and why the country should, at the bidding of the miners and the Miners' Federation (which was essentially a socialistic organization), be condemned to pay 18d. per ton more for coal, he did not know. No body of men were more capable of looking after their own interests than miners; and he was in a position to say that this demand for an eight-hours day was purely a socialistic move. It came out before the Labour Commission. The idea was not merely an eight-hours day for miners; it was only the beginning. It was the first and important step towards an eight-hours day generally. When he was on the Labour Commission, he asked witnesses: "You want to absorb the unemployed. Supposing you get an eight-hour day, and it does not absorb the unemployed, what would you go for then?" Two or three of them answered: "For six hours." If, therefore, Parliament conceded this eight-hours day to the miners, it would do vast injury to the country in every direction. So far as the Company were concerned, if they had to pay more for coal, they would have to transfer the extra cost to the gas consumer. It was the private consumer who would suffer most; and the private consumer was the least able to protect himself.

THE EMPLOYEE-DIRECTOR.

The fourth paragraph of the report dealt with an important matter—that was the Employee-Director scheme. Since the last meeting, the Board of Trade had approved of the scheme for making the Employee-Director practically a permanency—at any rate, up to 1950—with power in case of failure (which he did not anticipate, and could not imagine) for the proprietors, under certain regulations, to terminate it. That part of the co-partnership scheme had worked in a thoroughly satisfactory manner. The workmen were perfectly free to elect any man they chose without any interference or suggestion from anyone in authority; and they selected two gentlemen—one a bricklayer and the other a carpenter. Mr. Waller was the first of the two elected; and Mr. Wyllie was the second. Both of them had stood for re-election; and the workmen had re-elected them. The workmen had an opportunity of changing their minds if they liked; but having found good men, they stuck to them. He thought he might say that the proprietors of the Company had been rendering a service to the nation by their courage in adopting this innovation, and by taking their employees not only into their confidence, but into absolute partnership with them. There was nothing in the accounts on this occasion as to workmen's bonuses and savings. This simply meant that the Board had invested in the Company's stock the bonuses and savings deposited. There was about £3000 or more that the men had on deposit besides about £27,000 invested in the Company's stock. In other words, close upon £30,000 of their money was in the Company; but there was nothing appearing in the balance-sheet, simply because they had invested it in the purchase of stock preparatory to the bonus distribution in July. The Directors had an opportunity two or three months ago of buying stock at a fairly low price; and they would be able to distribute it at the bonus distribution at a rate that would be satisfactory to the employees. They had to provide some £3000 or £4000 of stock for the employees year by year. They could not go into the market and get this all at once. Therefore they looked out for favourable purchasing opportunities; and this year he thought they had purchased well.

CO-PARTNERSHIP BEGINNING TO SPREAD.

Further about this Employee-Director question, he was sorry that so few gas companies had followed their example. The scheme had been going on now for a great many years—in the case of this Company for fourteen years; but very few gas companies had paid them the sincerest form of flattery by imitating them. It was, however, beginning to go now. Two or three weeks ago, the Leamington Gas Company decided to adopt the system; and now, within the past week, he had heard that the Walker and Wallsend Gas Company had done the same. They were satisfied that co-partnership was the only solution for the Capital and Labour problem. All other things were simply palliatives. Look what had happened in the cotton trade only two or three months ago; and Mr. Lloyd-George, having settled for a time the railway difficulty, went down and brought the opponents together. Then there was another serious dispute; and now what had happened in the North of England with the shipbuilding trades? The relations of employers and employed were as unsatisfactory as they could be; here they were as happy as they possibly could be. He might almost compare their condition to the promised land. He was reminded of the Israelites in the wilderness. They were told to go up and possess the land. But they had not the courage to do it. There were giants in Canaan; and ten out of the twelve Israelites who went to view the land came back with a sorry tale, and, instead of possessing the land, they wandered forty years in the wilderness. Here was the promised land for employers and employed to occupy, and there they would be happy. Otherwise they must wander in the wilderness. Some credit was due to the shareholders in this Company; for the Directors could have done nothing without them. They had shown their hearty sympathy with the movement; and they had done their part both to the Company and also in showing the employers of Great Britain how peace could be secured.

REMUNERATION OF THE SECRETARY.

There was another paragraph in the report, in connection with which he should have to submit a resolution to the proprietors. The Directors appointed the Secretary; but it rested with the proprietors to fix his salary. It was five years since they gave the Secretary an advance; and so a motion would be put before the meeting to increase his salary this year. In Mr. Ohren, they had a very devoted officer—a man thoroughly in earnest in his work and faithful in doing his very best for the Company; and the Directors thought the time had come when they might make this proposal.

INCAPACITATED BY AGE FROM OFFICE.

He had a remark or two to make on the paragraph of the report referring to the two retiring Directors. One of them was Mr. C. Lea Wilson. He (the Chairman) was sorry to have to say what duty compelled him to say that day. Mr. Lea Wilson had been a Director for over forty years; he had been a resident in the Company's district all the time; and he had rendered great service to the Company, particularly in the early days. The late Sir Erasmus Wilson during the last year of his life was unable to attend the Board. But he was the largest shareholder, and had been the Chairman for a great many years. He continued to hold his name on the Board until he died. Then the next Chairman followed in the same way. He was unable to attend for a

considerable time—a year or more—and the Directors waited. The next Chairman (Mr. Linging) wrote to him (Sir George), as Deputy-Chairman, and said he felt he could not attend the meetings of the Board any more, and wished to have his name withdrawn. They did not, however, accept it at the moment. In the case of Mr. Lea Wilson, he was in his ninety-third year; and he had not attended a Board meeting since July, 1906, and had not attended a proprietors' meeting for over four years. They would very much like to keep his name on as a Director; but the time had come for his retirement by rotation. He would never attend a Board meeting again. He could not go upstairs now. While they would like to see him re-elected, they could not, simply for the reason that when a man was unable to attend and perform his duties, however great his services had been in the past, propose him for re-election. He was sorry to say this. The old gentleman would very much like to have his name continued as a Director to the last. Mr. Lea Wilson was a member of the Court of the Goldsmiths' Company, and they were keeping his name as a member of the Court, though he never attended, and would never attend again. Their own Company, however, was a business concern. The Goldsmiths' Company was rather different; membership of the Court was not like a directorship. And should a man be re-elected to the office of a director if he could not perform the duties? ["No, no," from several proprietors.] However, Mr. Lea Wilson said he would let his name stand; and if the proprietors did not re-elect him, he would accept the decision, and would accept it with good grace. As the Directors would not make a motion on the subject, it was open to any proprietor to do so. He (the Chairman) would not like to see any voting against him. They all, however, thoroughly appreciated the good work he had done, and were very sorry to lose him as a colleague.

Mr. CHARLES HUNT seconded the motion.

A Shareholder's Appreciation.

Sir GEORGE BARHAM said he did not think there was anything the shareholders could find fault with. The Chairman's speech had been a very able one, and very gratifying to those present. It must be particularly gratifying to the consumers of gas to contemplate the fact that though apparently the price of coal had increased something like 20 per cent., the rise in the price of gas had only amounted to about 3 per cent. This showed that the Company must be extremely well managed; and he felt that the consumers, as well as the shareholders, must be very grateful to the Board. It was also pleasant to know that the prospects were fairly promising. The Chairman had told them that the price of gas coal was 1s. 6d. per ton less now than it was at the corresponding period of the previous year, and that according to his judgment—which he (the speaker) supposed was second to that of no man in the kingdom—it was likely to fall still lower in the future. This enabled the shareholders to look forward with some sort of pleasure to having the dividend up again to the same figure that it stood at a little while ago—or perhaps a little higher. As to the miners' eight hours movement, all he could say was that he hoped it would find an early grave. He was a somewhat large employer of labour, and had for years been endeavouring to reconcile the interests of the employees with those of the master, but without being entirely successful. It was therefore specially gratifying to him to learn that the co-partnership arrangement which had been brought about, he thought, by the South Metropolitan Gas Company in the first instance, had worked so satisfactorily not only in that case, but also in connection with the South Suburban Company. He remembered quite well the fight that took place in the South Metropolitan Company, when they had their great strike; and he could not say how much he admired the ability with which it was conducted. If, however, he might say so, he admired still more the arrangement that was made after the fight, by which the two parties became great friends, and were able to work in the most satisfactory manner. This should be copied by other gas companies. The election of workpeople on the Board must give an immense amount of confidence to the men, because whatever promises were made to them, unless the men were represented on the Board, they were inclined to be suspicious. This was the first gas company's meeting he had attended, because he had hitherto invested in electric lighting; but what with the new mantles and the energy of the managers of gas undertakings, he now thought these were very desirable investments, and so he had made a start with the South Suburban Company.

The resolution was then carried unanimously.

The Dividend.

The DEPUTY-CHAIRMAN (Mr. Robert Morton), after pointing out that the reduction of 3s. 4d. per cent. in the dividend was explained in the first paragraph of the report, and stating that the full dividend allowed by the Act was recommended, moved—"That a dividend for the half year ended Dec. 31 last be now declared at the following rates per annum: 5 per cent. on the preference stock, and 5⅓ per cent. on the ordinary stock, less income-tax."

Mr. W. G. WALLER (a Workman-Director) seconded, and said that, in so doing, he wished to thank the proprietors for the great interest they always took in the employees. This interest had not been misplaced; and he could assure them that the workmen and their families were a credit to the gas industry. Being part proprietors, they would naturally do their utmost for the prosperity of the Company.

The motion was agreed to.

Election of Director and Auditor.

The CHAIRMAN then moved that Sir J. Fortescue Flannery, Bart., be re-elected a Director of the Company. Sir Fortescue was well known; and he did not think it was necessary for him to say anything in recommendation of the proposal. He was an energetic, capable Director, and one who took great interest in the affairs of the Company, and with whom they all worked in friendly accord.

Dr. S. TURNER seconded the motion; and it was carried.

Thereafter the retiring Auditor (Mr. Samuel Wood) was reappointed, on the proposition of Mr. THOMAS GUYATT, seconded by Mr. T. WILKINS.

The Secretary's Salary.

The CHAIRMAN next moved that the salary of the Secretary be increased by £150 per annum as from Jan. 1 last. He remarked that he had already spoken of Mr. Ohren; and he did not know that it was necessary to add anything more.

The DEPUTY-CHAIRMAN, seconding, said that, coming in contact with Mr. Ohren constantly, he could do so with great confidence.

Sir FORTESCUE FLANNERY said perhaps he might be allowed to combine the agreeable duty of supporting the resolution with the equally agreeable duty of thanking the shareholders for the renewed proof of their confidence in re-electing him to his seat at the Board. He never liked to speak at meetings of the Company without saying once again how fully convinced he was—his faith and his conviction grew stronger year by year—of the benefits of the co-partnership system which had now begun to be thoroughly rooted in the commonwealth of the country, and of the immense part it would play in the future in solving the great problem of the difficulties between Capital and Labour.

The resolution having been unanimously agreed to,

Mr. OHREN returned thanks. He said it had been his pleasure to serve the Company since 1868, and naturally he had seen many changes; but the most beneficial of these for all parties concerned was the system of co-partnership which the Chairman had introduced. He would also remark, to prove the fallacy of the supposition that residence in close proximity to a gas-works was detrimental to health, that he only remembered being absent on two occasions in forty years—once owing to an accident, and once through influenza.

Votes of Thanks.

Mr. POWELL proposed a vote of thanks to the Chairman and Directors; remarking that he hoped Sir George Livesey would be able to continue his work for the Company for forty years, in the same way that the Secretary had done.

The CHAIRMAN: I have had 33 years in the Company now.

Mr. BORASTON seconded the motion, and referred also to the services of the staff, which he pointed out were acknowledged in the report, where it was stated: "The Company is well served by its two chief officers, by the staff, and workmen; and the Directors are pleased publicly to express their satisfaction with the manner in which the employees of all grades perform their duties." This, he said, was in itself a certificate of honour.

The vote having been heartily accorded,

The CHAIRMAN returned thanks. Alluding to the election of Directors, he pointed out that this depended on the Board, though it never appeared to him to be quite right. He thought the shareholders were the proper persons to elect Directors; but as they were a number of units, and naturally did not know each other, the Board were no doubt in a better position to select the most suitable men. They had now the responsibility of finding a successor to Mr. C. Lea Wilson. It would be an anxious time for the Board; but they would allow no personal considerations to weigh with them. They would endeavour to select the most fitting man for the post. Some years ago, the shareholders agreed to increase the remuneration of the Directors to £2500 a year. The Board said they would not take more than £2200; but, as a matter of fact, they had limited themselves to £2100. The difference was reserved for the future Chairman. They did not want a Chairman who was past work; they required a man well versed in gas matters and in the prime of life. They could not expect such a man to give his services for inadequate pay; and the £300 or £400 a year was held in reserve so that the Company might get a good Chairman when he (the speaker) was taken from them. In their co-partnership they aimed at something more than the sharing of the profit. If that were all, it would not be much. Their principle was that any opening there might be in the Company should be filled up if possible with someone in their service, so that every co-partner might feel there was a possibility for him to rise. In the South Metropolitan Company they had just appointed a new Secretary who began as a fitter's boy 35 years ago. This sort of thing, he thought, was typical of co-partnership, which had made a complete revolution in the relations between employers and employed. If any question arose, it never got further than a question; it had only to be mentioned to be set right. Simmering discontent was unknown. He wished all employers, and particularly all gas companies, were in the happy state of the South Suburban Company. He therefore, with great pleasure, proposed a vote of thanks to the officers and workmen of all grades—coupling with the vote the names of Mr. S. Y. Shoubridge, the Engineer, and Mr. Ohren.

The vote having been accorded,

Mr. SHOUBRIDGE returned thanks on behalf of the engineering staff and workmen. He said he was indebted to the Workmen-Directors—Mr. Waller and Mr. Wyllie—who had helped him enormously in his work, not only by the splendid example they set to their fellow-workmen, but by the many valuable suggestions they made to him from time to time. It was doing them the barest justice to say that a considerable part of the success which had been attained was due to them. It was of the greatest benefit to the Company to have two Directors upon the works every day, and all the day; and he wished to thank them for the assistance they always rendered and the enthusiasm they had displayed.

Mr. OHREN also briefly acknowledged the vote on behalf of the clerical staff.

Depth of Gas-Mains at Kingstown.—The Kingstown Urban District Council have adopted a Committee's report containing a recommendation "to resist all claims made by the Gas Company or others on the ground of injury to gas mains or pipes, if, in the opinion of the Surveyor, the said mains or pipes are not laid at a sufficient distance beneath the surface of the road." Sir Thomas Robinson said it had been discovered that some of the gas-mains were only laid 4 inches under the surface. It could not be maintained that this was a safe distance to have the pipes under the earth; and it was absurd to say that the Council could be held responsible for damage done to them by traffic. He considered that 24 inches would be a reasonable depth at which to have the pipes laid.

LIVERPOOL UNITED GASLIGHT COMPANY.

Cultivating a Home Market for Coke.

The Half-Yearly Meeting of the Liverpool United Gaslight Company was held last Tuesday, when the Chairman (Mr. H. Wade Deacon), in moving the adoption of the report, said that though there were no accounts to present, the usual statement had been prepared, and showed a satisfactory result. There had been a large increase in the expenditure, as they anticipated, owing to the greater cost of fuel; but, on the other hand, they had had an increased sale of gas, the consumption having advanced by nearly 3 per cent. Moreover, the increase was not confined to one particular class of consumers. They had also had most satisfactory results in the sales of residual products. For some time past, they had been trying to cultivate a home market for coke; and he thought they were beginning to reap the benefit. He hoped that in the future, when the price of coal had come to a more normal condition, they would still benefit by being able to sell a larger proportion of their coke in the Liverpool district. On the whole, the results had quite come up to expectations; and the Directors had been perfectly justified in the policy they adopted of not increasing the price of gas. It was a very serious matter for consideration last August as to whether or not they should raise the price; but the policy of the Directors so far had been justified. He ventured to hope that, when the accounts were published next August, the shareholders would feel that the Directors had been pursuing a wise policy, and that the concern was carefully and well managed. He trusted that the ordinary consumers would not be dissatisfied when they considered that, in spite of the increased price of coal, they had been able to supply the same high quality of gas—20 candles—at the same price as during the last two years. It would probably be interesting to consumers to know that the Directors did not propose to increase the price of gas during the next six months.

The report was adopted; and the statutory dividends were afterwards declared.

NEWCASTLE AND GATESHEAD GAS COMPANY.

Many Difficulties Satisfactorily Overcome.

The Annual Meeting of the Newcastle and Gateshead Gas Company was held last Wednesday, under the presidency of Sir W. H. Stephenson, the Chairman. The report recommended the payment of dividends at the rate of 4 per cent. per annum on the preference stock and 4⅜ per cent. on the ordinary stock.

The Chairman, in moving the adoption of the report and accounts, remarked that the past year had been a somewhat anxious one for the Directors of the Company. Many circumstances occurred to militate against good working. They had to face difficulties that were entirely unexpected; but he was thankful to say that these had been overcome and satisfactorily adjusted. A most formidable matter had been the boom in the coal trade, and the exceptionally high price the Company had had to pay for the considerable quantity of coal they consumed—more than 300,000 tons in the year—from July 1, 1907, to July 1, 1908. But they had had a considerable amount of coal that had been supplied under old contracts, during the current year, so that the price turned out to be not so excessively high as it would have been under other circumstances. They had to contend, also, against short deliveries. Contractors found they were able to get more for their produce than the Company were able to pay; and so the coal was diverted into other channels, and the Company had to take their chance. Perhaps the most disturbing element in the half-year's proceedings was the threatened railway strike. Almost to the last day they were under the cloud, and had fearful forebodings as to what was going to happen. They at one time feared that communication between the works and the collieries was to be closed; and it was a matter of serious moment to see how they were to get coal so as to keep Newcastle and Gateshead and the surrounding district fairly supplied with gas during the time the strike might have lasted. However, fortunately for them, and for the railway companies, and for the men, such a disastrous thing as a complete stoppage of work was avoided. They were able to pay the statutory dividend without encroaching upon the reserve fund, and they had paid the loan interest, and interest on the preference shares, and had actually been able to add a little to the reserve fund. The revenue from all sources for the year 1907 amounted to £418,258. Of this, £262,595 was received for gas, £121,670 for residuals, £32,002 for rentals of meters, stoves, and lamps, and £1991 from other sources. The expenditure amounted to £312,735, which left £105,522 as the gross profit for the year, out of which £18,326 had been paid for interest upon debenture stock and loans, and £43,035 for the interim dividend in August—leaving £44,161 to pay the second half-year's full statutory dividend of £43,767 recommended by the Directors. This would leave a surplus of profit for the year of £393, which, added to the balance brought forward from 1906, left £18,592 to be carried forward to the credit of the present year. The gross revenue of £418,258 was the largest the Company had ever received. On the other hand, the expenditure was about £11,000 less than in 1901—the year of the previous coal boom. The results of the year's working might be claimed to be very satisfactory indeed, especially when they considered the increase in the price of coal. This had cost £32,590 more than in the previous year; and, moreover, from July 1 a substantial concession had been made to users of gas for power purposes by an increase of the discount to 25 per cent. for prompt payment. The ability of the Company to meet the additional expenditure for the year was materially assisted by the better prices realized for coke; the receipts from this source having been £24,199 more than in 1906. The yield from tar was £518 more, and from sulphate of ammonia £1317 more; the average value of tar being a little more, and of sulphate of ammonia a little less, than in 1906. There appeared to be a slight, but steady, rise in the value of tar, probably due to increasing use of the article for road-making and dust-laying purposes. The quantity of gas sold during the year reached a total of 3,028,356,000 cubic feet, an increase of nearly 68,000,000 cubic feet, or 2·29 per cent., upon the quantity sold in 1906. This was the first year in their history that a total of 3,000,000,000 cubic feet of gas had been sold. The amount realized for the quantity sold was £262,595, as against £255,694 in the previous year; being an increase of £6320 in the private consumption, and £581 for public lamps. The Company were now serving 98,684 consumers with gas. Of this number, 6695 had been added during the past year; 5490 being prepayment, and 1205 ordinary consumers. The demand for prepayment installations was far from being exhausted. The proportions at Dec. 31 were 47,869 ordinary and 50,815 prepayment; the latter therefore for the first time outnumbered the former. Cooking-stoves were hired by 58,285 of the consumers; and, in addition, many consumers owned their stoves. So far, the Company had, owing to the circumstances to which he had already alluded, been able to get along without raising the price of gas; but whether it would be possible to continue to avoid an advance, would very much depend upon the state of the coal and coke markets during the next few months, when the contracts for the year commencing July would have to be negotiated. The price of gas would not be raised unless it was absolutely necessary to do so. Cheap gas was best for both consumers and shareholders.

The report was adopted, and the dividends recommended by the Board were declared.

CROYDON GAS COMPANY.

Coal and Gas Prices—Good Increases in Consumption and Numbers of Consumers.

The Half-Yearly Meeting of the Company was held on Friday, at the Offices, Katharine Street, Croydon—Mr. Charles Hussey in the chair.

The Secretary (Mr. W. W. Topley) read the notice convening the meeting. The Directors' report and the accounts were taken as read.

The Chairman, in moving their adoption, said the Directors felt great pleasure in being able to place so satisfactory a balance-sheet before the proprietors. The twelvemonth, one half of which they had now passed through, was one to which the Directors looked forward, he would not say with misgivings (for no member of the Board had other than the fullest confidence in the bright future of the Company), but as a year in which several causes would combine each of them unfavourable to showing a good balance of profit. They had had to face a large increase in the price of coal; and they had reduced the price of gas in Carshalton to an extent representing over £2000 per annum. For several half years past, too, large amounts of capital had been spent upon increasing the productive capacity of the works; and he need hardly point out that, while expenditure of this nature must always be made some considerable time before it was productive of profit, interest or dividend (as the case might be) had to be found from the moment the necessary capital was raised. Further, they had hardly yet reached the point when the acquisition of the Caterham undertaking was a source of profit. That the concern would prove in the future, as the Carshalton one (acquired in 1894) had proved, a valuable one to the Company, the Directors did not doubt. But the immediate effect on the Company's finances had not been any material augmentation of profit. Then there was the fact that the reorganization of the manufacturing plant and the adoption of modern and improved methods, though highly profitable in the long run, involved at the time considerable expenditure which could not with propriety be charged to capital account even if the Board were willing to do so; and a reference to the accounts would show that there had been met this half year a charge of this character amounting to £8000, of which £2775 had come from the earnings of the six months. Taking together the operation of all these causes, there would have been no reason for surprise if the half year had appeared from the accounts a somewhat unprofitable one. But thanks to the exceedingly good working results in the manufacturing department (which reflected the greatest possible credit on their Engineer and his staff), to savings in distribution expenses, and also to the good prices realized for coke, they had been able to meet all the difficulties he had mentioned and provided for the dividend without having to take more than £2940 from the balance of £7487 brought forward. As he told the proprietors last August, the contracts the Directors made for the coal supply during the year ending next June were at prices which represented an increased cost to the Company of £12,000. The Directors had at all times felt the very greatest reluctance in raising the price of gas; but they also felt that some part of the extra expense to the Company, arising from causes entirely outside the Company's control, might fairly be borne by the consumers. The price of gas was therefore advanced by 2d. per 1000 cubic feet, but not until after Christmas. This advance would return to the Company in the second half of the year (1907-8) about £5000 out of the £12,000 he had mentioned. He did not forget that, with the rise in the price of coal, had come an increase in the price of coke, from which the Company benefited. Perhaps slightly over half of the remaining £7000 would be recovered from this source; and the Company would bear the £3000 or so which was left. It would be rash to prophesy, in the present uncertain state of political and other causes affecting the coal market, what would be the trend of prices in the next year or two; but the Directors were not without hope that they might be able to secure coal for 1908-9 at prices less inflated than those they were now paying. He thought he might promise that, if an abatement to any appreciable extent from the present prices were obtained, the price of gas would be reduced after Midsummer. In the accounts, the proprietors would be able to see from the comparative figures evidence of the steady growth of the undertaking. The quantity of gas sold had increased by 4·55 per cent. This represented in quantity over 26 million cubic feet, in money £2635; but it must be remembered that, as from Midsummer last, the price of gas in the Carshalton area had, under the operation of the Company's Act of 1904, been reduced to that charged in Croydon, or by 3d. per 1000 cubic feet—representing a gain to the

consumers in the Carshalton area of £1056, and a corresponding diminution in what would otherwise have been the receipts of the Company from the sale of gas. While dealing with the question of gas sales, it might be of interest if he mentioned two records the Company had recently established, though strictly speaking they belonged to the current half year. On Saturday, Jan. 11, they had sent out 5,737,000 cubic feet of gas—the largest quantity hitherto distributed on any one day; and on Sunday, Jan. 12, the output had exceeded that of the corresponding Sunday of last year by the startling amount of 37·4 per cent. It would have been noticed that these increases occurred during the cold and inclement weather of last month; and this suggested two interesting points. First, the greatly increasing extent to which consumers were appreciating the use of gas as a useful and convenient source of warmth; and, secondly, the increasingly violent fluctuations of demand which gas undertakings might have to face during the winter months, which were always the time of greatest output. Having the possibility, nay the probability, of such fluctuations in mind, no gas manager or board of directors to-day would be justified in neglecting to provide an ample margin of manufacturing plant beyond what they might have found in the past to suffice for the requirements of their consumers. The growth in the number of the consumers proceeded steadily. In the past six months, they had added 1251, or in the twelve months 2180. Of this latter number, 1331 had been of the prepayment class, which now numbered in all 15,333, or within 734 of the number of ordinary consumers. Some of the proprietors might have noticed during the last few years a steady and marked increase in the expenditure under the heading of collection. This is due to the rapid extension of the weekly prepayment system. He had on several occasions given reasons which led the Directors to the conclusion that, at all events in a district such as the Company's, where excessive poverty happily did not exist to so great an extent as in some other districts, the weekly prepayment system of supply by "stop" meters was preferable to the "penny-in-the-slot" meters more usually adopted by other gas companies. He would not now recapitulate these reasons; but it was somewhat interesting to note, in the report of a neighbouring Metropolitan Gas Company, that during last half year the sum of £465 was lost through the breaking open of the money-boxes of 4143 slot-meters. This represented an average "haul" to each thief of about 2s. 3d. But the damage sustained by the meters must have made the cost to the Company concerned very much greater than this. A danger of this kind was one that might tend to grow; and the temptation to which needy consumers were exposed in times of difficulty must be a severe one. The Company could at least feel that the system of supply which they had adopted presented neither an opportunity to the thief nor a temptation to the poor but honest man. The output of stoves showed a steady growth, and one proportionately greater than that of consumers; showing that more and more of the consumers were coming to an appreciation of the value of gas as an agent for cooking and heating, as well as for lighting. The total number of stoves now on hire was 19,276; and the total number of fittings for which they were receiving rental from prepayment consumers was 56,278. In 1907, they received £3048 as payment for the hire of these fittings. At the works, the new section of scrubbing, washing, and purifying plant recently erected to work in conjunction with the large retort-house formed by the recent doubling in size of No. 3 house had been brought into action. It was first set to work on Sept. 12, and had through the winter been dealing, with very satisfactory results, with all the coal gas made. The starting and working of this plant—practically a new gas-works of very considerable size—had been attended with scarcely a hitch; and the Directors could not speak too highly of the skill with which the new works had been designed throughout by their Engineer and General Manager, nor of the loyal assistance and care shown by all the officers who had been concerned in their construction and early working. To meet the payments of the great expenditure named, they had during the half year issued by tender (in November) £15,000 of "D" stock. This realized an average price of £108 13s. 6d.—not quite so high as was obtained in March last, but still a price which, considering the state of the Money Market, they could not but view with satisfaction. [Very properly the Chairman here again uttered a warning note to investors in regard to the flotation of certain companies for the supply of gas and water.] Proceeding, he said that some years ago parliamentary powers were granted to a Company for the supply of electricity to certain parts of their own district outside the Borough of Croydon. These powers were on the point of lapsing by reason of non-compliance with the requirements that they be exercised within a stated time, when the Corporation of Croydon, by an agreement with the Company concerned (most unfairly in the opinion of the Directors of the Gas Company), undertook to allow the Company to draw electricity in bulk from the Corporation mains; thus saving the former the risk of laying out capital on a generating system of their own. The Directors had been unable to find that any powers had been granted to the Corporation empowering them thus to supply current in bulk for sale outside their area; and they had been advised that in so doing the Corporation were acting illegally. As would be seen from the report, the Directors had as from the end of the year ceased to use the Caterham Company's works at Whyteleafe, which were shut down in April last, as a depôt for the sale of coke. For some eight months they tried the experiment of sending coke made at Waddon to these works, and selling it from there to meet local retail requirements; but the quantity sold had not justified continuing the expense of keeping the depôt open. The competition between gas and electricity as a means of lighting was nowadays severely pushed by the managers of electrical undertakings; and the Croydon among other gas companies at times came across statements and suggestions as to the relative cost which were, to put it mildly, misleading. He concluded by quoting the actual experience of the Borough of Camberwell in lighting one of their public libraries, the facts concerning which were quoted in the "Journal" for Jan. 7, p. 54.

The Deputy-Chairman (Mr. T. Rigby) seconded the motion.

Mr. Hovenden said the capital of the Company was now round about £667,000; but if reference was made to the reserve and insurance funds, it would be seen that they had a comparatively small investment in Consols.

Mr. R. Hesketh Jones said he should like to point out that to invest in 3 per cent. Consols was poor finance. It was far better, instead of raising additional capital, to employ the money in their own works.

The Chairman thought if the reserve and insurance funds were compared with those of any other gas company of the same size, it would be found that their own funds stood in quite as satisfactory a position. He might say on behalf of himself and his colleagues that he hoped they had now nearly done for a time with spending large sums of money; and, when they had a rest, the Directors would look into the question of the reserve and insurance funds. He could not agree that they should use the money in reserve in the works. A good amount invested in Consols was an excellent backbone to any company.

The motion was unanimously carried.

Mr. William Cash, F.C.A., proposed the declaration of dividends at the rates per annum of 14½ per cent. on the "A" stock, 11½ per cent. on the "B" and "C" stocks, 5 per cent on the "D" stock, and 10 per cent. on the "E" stock. He remarked, with regard to the renewal fund, that the Board provided fairly considerable sums of money years ago for renewals; but they had largely used the money for extinguishing the cost of the old buildings that were pulled down. They had now taken in hand the remodelling of No. 2 retort-house on the same lines as had proved so satisfactory in No. 3 house.

Mr. Samuel Spencer seconded the motion, which was unanimously carried.

Proposed by the Chairman, and seconded by Mr. W. J. Russell, Mr. T. Rigby, one of the retiring Directors, was re-elected; and on the motion of Mr. Cash, seconded by Mr. P. H. Hall, Mr. Corbet Woodall was also returned to his seat at the Board. The retiring Auditor (Mr. J. C. Benwell) was likewise re-appointed.

Moved by Mr. Hesketh Jones, and seconded by Mr. Benjamin Green, a hearty vote of thanks was passed to the Chairman and Directors.

The Chairman, having responded, alluded in eulogistic terms to the services of the Engineer and General Manager (Mr. James W. Helps), the Secretary (Mr. W. Topley), and their staffs; particular mention being made of the services of the Assistant-Engineer (Mr. Caddick) and of the Distributing Superintendent (Mr. Sandeman).

Mr. Spencer seconded the motion; and it was very cordially agreed to.

Mr. Helps, in his reply, made the interesting statement that the number of men engaged in the outdoor department—the men who had to deal with the gas after it was made—now numbered as many as those who were engaged in the works in making the gas. This was an interesting condition of things that had arisen during the past few years.

Mr. Topley also briefly replied for himself and his staff; and the proceedings then terminated.

BOURNEMOUTH GAS AND WATER COMPANY.

Good Development—Settlement of the Assessment Question.

The Half-Yearly General Meeting of this Company was held last Friday, at the London offices, No. 90, Cannon Street, E.C.—Mr. G. Crispe Whiteley in the chair.

The Secretary (Mr. William Cash, F.C.A.) read the notice convening the meeting; and it was agreed to take as read the Directors' report and accounts.

The Chairman said it was his duty and pleasure to place the report and accounts before the proprietors. The past half year, speaking on the whole, had not been a very grand one for gas companies, mainly owing to the remarkable mildness of the season, and, of course, more important still, to the increased price of coal. With regard to the first cause, the Company were fairly fortunate, because although the mildness of the season might be detrimental to gas companies in general, the salubrity and climate of Bournemouth was really part of their stock-in-trade; and the visit of the Emperor of Germany had given them the additional fillip they wanted. They were therefore able to put on the other side the improvement in this respect. Fortunately, the mildness of Bournemouth was a source of attraction; and therefore they must not complain. In regard to the price of coal, they had been able to meet that well through various causes. They had a good stock of coal at the original price with which to start when the cost went up; and they were able to show an increased revenue from residuals by £1641. In addition, they had been enabled, by the economies they had effected by getting their coal into Poole Harbour, to make up, and more than make up, for the increased cost of coal. In fact, during the past half year, they had had the full advantage of their new works; and he thought the result had absolutely justified the expenditure in erecting the works. The most satisfactory feature in the report was the increase in the sale of gas by more than 6 per cent., which, he was sure, the proprietors would all regard as most gratifying. The water-works at Wimborne had been maintained in the highest possible state of efficiency; and, in order to be in a perfectly safe state, they were now increasing the boiler power there. The Board always played for safety in dealing, more especially, with the water supply. It would perhaps be remembered that by their Act of 1902 the Company were bound, at a certain date, to reduce the price of gas in Poole. The price was reduced by 2d. per 1000 cubic feet from September, so that the proprietors must make allowance for that in considering the half-year's figures; the reduction being, of course, spread over half the period covered by the present accounts. At one of the meetings some little time ago, he pointed out that the value of their securities on reserve account were entered in the accounts at the amount at which they were purchased. As there had been a general depreciation—no matter how carefully the securities were selected, no matter how high their character—it was obvious the amount placed in the balance-sheet did not coincide with the actual value had they been compelled to realize. This not being a satisfactory state of things, he previously told the proprietors that the Board would, when a favourable opportunity arrived, write down the securities to their actual value. They felt themselves on the present occasion justified in fulfilling that promise. It would

be noted that they were writing down the securities to their value on Dec. 31, and were placing £2500 to the reserve in order to enable them to do this. He hoped the proprietors would agree that this was sound finance; and that by their action the Board were strengthening the Company. Personally, he was glad they had been able to do this so early. But, for the satisfaction of the proprietors, he might add that the value of the securities since Dec. 31 had gone up; so that, instead of their value being shown in the accounts at much more than actual value, they were shown at less than actual value. At Bournemouth, as elsewhere, gas was holding its own; and they had really little to fear from any competition. He was glad to be able to point out that the gas industry was able to adapt itself to the changing circumstances and vicissitudes that must from time to time arise. He said this because his attention had been recently drawn to what he believed was an "Official Guide" to Bournemouth. In that guide, the popularity of electric light was spoken of; and they were informed that it was rapidly superseding gas and other methods of lighting. The figures upon which this somewhat bold statement was made arose from the fact that there were 3500 consumers of electricity in Christchurch, Bournemouth, and Poole; and when he reminded, as he was glad to remind, the proprietors, that, in a somewhat smaller district—that was, striking out Christchurch, and dealing only with Bournemouth and Poole—there were something like 19,000 deluded individuals [Laughter] who were still purchasing gas, and were likely to continue to do so, they would see the Company were able to postpone to a distant future that absolute supersession with which this guide was confidently dealing. Statements and circulars were being distributed very largely over Bournemouth and the district which seemed to point to a contest and campaign which they, on the part of the Gas Company, did not intend to enter into. The view of the Board of Directors was that there was plenty of room for both gas and electricity; and all they were anxious for was that there should be a fair field and no favour. They should insist [on giving the ratepayers and occupiers the fullest possible choice as to light. They should insist so far as they were able to do so on gas-pipes being put into houses; and when they were there, they would be perfectly content to let gas stand on its own merits. With regard to the assessment of the Company's property, as the proprietors were aware, there had been trouble over this matter for some time. The Board had objected to the very high assessments which the public rating authorities had put upon them; and the Directors felt bound to contest the rating. From the reference in the report, it would be seen that the matter was, when the report was issued, still *sub judice*. But the Board had been informed that morning that the whole matter had been settled; and he could heartily congratulate the proprietors upon the settlement. A very substantial reduction had been made upon the figures to which the Directors objected. They had not got exactly what they wanted; but the reduction was, as he said, a substantial one. In accepting this, the Board had been largely actuated by their strong desire to meet, if they possibly could, the local authorities, and to deal with them in a non-combative spirit. He thought they might congratulate themselves upon the settlement. They had agreed with their adversaries, but he could not say quickly. It had taken a little time; and some expense had been incurred. The Board had, in agreeing to the terms, also been actuated by the fact that they would save considerable expense by not launching into an expensive arbitration. He felt that, in many ways, the present report was one of the most satisfactory he had ever had the pleasure of laying before the proprietors. They had not had the tremendous leaps and jumps of past years; but, on the whole, the way in which troubles and difficulties had been met by their resources pointed, he thought, to the strong position which gas held as an industrial undertaking.

Mr. CORBET WOODALL, in seconding the motion, referred first to the settlement with the rating authorities in the Poole Union. He was glad to say the settlement was not simply for the present rate, but it was a settlement for five years to come. He entirely shared, having been chiefly responsible for the settlement, the satisfaction expressed by the Chairman, and especially as they had come to an agreement without an irritating and costly fight before an arbitrator. The Chairman had remarked upon the half year as being one not very favourable to gas companies. He had heard that statement more than once lately; and yet it was somewhat remarkable, and perhaps encouraging to know, that the reports that had accompanied the statement had been almost invariably ones of the most satisfactory character from the shareholders' point of view. Whether it was the stress of necessity that brought out latent capacity in their officers and possibly even, in a humble degree, in the Directors, he did not know; but they had come well through a half year that promised to be one of great trial. The greatest trouble that was before them at the beginning of the half year was the price of coal; and he was glad to hear the Chairman speak of the half-year's accounts having justified the expenditure made at Poole. The accounts showed very clearly that while 2s. 6d. more per ton was paid for coal, which was the equivalent of about 3d. per 1000 cubic feet of gas sold, the actual charge for coal was only a few pence more per ton—the cost of getting the coal to Poole being so much lower than the cost of getting it to Bournemouth. So that this had largely wiped out the extra charge for coal. With regard to the works, their Manager had made rather less water gas in the half year than in the corresponding half of 1906, showing one of the advantages of this system of manufacture—that, when the price of coke was high, and it was advisable to sell as much as possible, they could reduce the proportion of water gas, and so avail themselves of the greater profits. He seconded the proposition with much pleasure, because he felt, having regard to all the circumstances, it was one of the most satisfactory reports they had ever had put before the proprietors.

A few complimentary remarks having been made by Mr. W. E. HOLDING,

The motion was unanimously carried.

On the proposition of the CHAIRMAN, seconded by Mr. R. HESKETH JONES, dividends were declared at the rates per annum of 6, 7, and 14 per cent. on the preference, "B" ordinary, and original shares respectively.

Moved by Mr. R. HESKETH JONES and seconded by Mr. HOLDING, the Chairman was re-elected to his seat at the Board, as was also Mr. Samuel L. Rymer, on the motion of the CHAIRMAN, seconded by Mr. A. W. OKE.

The retiring Auditor (Mr. F. G. Barrett) was also reappointed.

Proposed by Mr. R. H. GLEN, and seconded by Mr. OKE, a hearty vote of thanks was passed to the Chairman and Directors.

The CHAIRMAN replied, and then paid a high tribute to the assistance and ability rendered by the chief officials and their staffs in the interests of the Company. He moved a vote of thanks to them.

The motion was cordially agreed to.

Mr. H. W. WOODALL, in reply, spoke highly of the work of the staff and employees generally at Bournemouth. With regard to the latter, labour troubles were heard of in various parts of the country. He believed there had been an attempt to form a branch of the Gas Workers' Union at Bournemouth; but he could testify that the men had never worked better than now, and he thought the fact was proved by the reduction in the total wages paid in every branch.

Mr. CASH, also in acknowledging the vote, said that the year 1907 marked possibly another stage in the Company's existence, because the quantity of gas made during that period was 700 million cubic feet; and it was only as long ago as 1900 that it was but half that figure. In seven years, therefore, the total make of gas had been as nearly as possible doubled. During that time they had, of course, taken over the Poole Company. When Poole was amalgamated, the number of consumers in that district was 1062, and the number at the end of 1907 was 4795, so that they had made a considerable advance there. Then, again, the taking over of the Poole undertaking was marked by another step. According to the Act, the first reduction there was to come into force on Sept. 30 last. The price that was being charged for gas when the Bill was in Parliament was 4s. 3d., less a discount, which brought the price down to 4s. 1d. The price of gas now in Poole was 3s. 4d. Therefore, there had been a reduction of 9d., or 18 per cent.

The CHAIRMAN observed that Mr. Cash had informed the proprietors that the make of gas had just doubled during the past seven years. Mr. Harold Woodall had been their Manager for exactly that period.

IPSWICH GAS COMPANY.

Many New Consumers.

When moving the adoption of the report and accounts at the annual meeting of the Ipswich Gas Company on Monday of last week, the Chairman (Sir Daniel F. Goddard, M.P.), said that the Company had passed through a very successful year indeed; the only difficulty having been one over which they had no control whatever—the increased price of coal. This increase had amounted to something like 1¼d. upon every 1000 cubic feet of gas sold; and this, of course, was rather a serious matter. As a set-off, however, there had been something like a corresponding rise in the value of residuals; so that the increased cost under this heading had really amounted to only ¾d. per 1000 feet. He thought they might fairly claim that in all branches of their manufacture there had been a distinct advance and a distinct economy; and his own opinion was that no gas company could be said to be doing their work properly unless they could fairly claim credit in these respects. Elasticity of manufacture in connection with gas meant that those who managed the affairs of the Ipswich Company—those who looked after the works and after the distribution of the gas—must keep their eyes open for every improvement, and be ready to "pounce" upon it, so as to make any desirable alteration at once. His own experience was that the education of a manufacturer of gas was never finished. In the year now under review, they had seen the good results of keeping up to the mark in compliance with what he had called the elasticity of their business. They had got better plant, which was working in a better way; they had had a better yield of residuals; and, though they had had to face this very serious increase in the cost of coal, they had fairly earned full dividends, and, notwithstanding keen competition by the town, had increased their output of gas—having really made a "record" in this way. As to the balance-sheet, there had been a decrease on almost every item of expenditure except coal and oil, on which there was an increase of £4000. With regard to the prospects for the coming year, he did not think he was taking too sanguine a view when he said there was a probability of the Company being able to buy coal at rather a lower price than that which obtained last year. As to the business generally, he could see no discouraging feature about it. Everything was going on exceedingly well; and they had so able a staff that they felt they could keep up to date in every department. They were continually increasing their sale of gas, though they were face to face with the continuous competition of the municipal electric light supply. There was a growing demand for gas-cookers. They had fixed an additional 1000 in people's houses during the past year; and they had sold something like 300 more gas-fires, which seemed to be coming into general use. The fact that 700 additional consumers had come on during the year, did not seem to indicate that competition was telling very seriously against the Company. They had 4379 consumers with ordinary meters, and 10,051 with slot-meters. When he gave up the control of the Company as Manager, and was succeeded by Mr. J. T. Jolliffe, somewhere about the year 1887, the total number of consumers was under 4000; while now, as he had stated, they had nearly 14,500 consumers. There was one other matter to which he must refer. No gas company could hope to go on without receiving a certain number of complaints. At Ipswich, they had complaints; and what he wanted to point out was that, if complaints were only brought to their notice promptly, they had invariably been able to deal with them at once, and to give satisfaction. The Directors earnestly wished that every shareholder would make it known to consumers that if the latter had any cause of complaint, and would at once communicate with the gas office, the matter would be immediately attended to, and things put right. This was a point of much importance. They did not mind how much trouble they took to give satisfaction to consumers, and were quite convinced that the article they sent out was as good as could be supplied. With regard to the success of the Company in the rating appeal, the

Directors hoped—although it was a too sanguine hope, perhaps—that the question had now been settled for good and all. They had for years contended that the Company's property was rated at too high a price, compared with other undertakings of an industrial kind. The decision of the High Court had confirmed the figure at which the Recorder fixed the rateable value of the undertaking; and it had, in addition, settled all the points except one that were in dispute between the Assessment Committee and the Company. The Company were not vindictive. They did not want to run the town into any expense; and they were perfectly willing to contribute their fair amount to the rates of the borough. He did hope, therefore, that, having arrived at this decision—at some cost, he was sorry to say, to the ratepayers—they might now come to some working agreement with the Assessment Committee, and keep clear of any difficulty or costly litigation in the future. The costs had to be borne by the Guardians—that was to say, the taxed costs, which did not include the whole expense. Other costs had to be incurred which were not allowed by the Court; and these the Company would have to pay.

The report was adopted; and dividends were declared at the rates of 13 per cent. per annum on the "A" stock, 10½ per cent. on the "B" stock, and 10 per cent. on the "C" stock, making with the interim dividend paid in September, dividends for the year of 13, 10½, and 10 per cent. on the "A," "B," and "C" stocks respectively. The Directors were also empowered to raise a sum of £20,000 by the creation of new ordinary stock. Votes of thanks were accorded to the Chairman and the staff; and Mr. Jolliffe, in replying, said that it was the 21st anniversary of his service with the Company; and he was proud to think that on no occasion of this character had these kindly references to the services of the staff and himself been omitted.

CHESTER GAS COMPANY.

The report for the half year to Dec. 31 as submitted at the meeting of the Chester Gas Company last week stated that the heavy rise in the price of coal had involved a large increase in the cost of coal carbonized; but this had been met by an increased return from the sale of residuals. In the absence of any further rise in the price of coal, the Directors confidently hoped it would not be necessary to increase the price of gas. The gas sold during the half year showed a satisfactory increase. The profit and loss account showed a balance to credit of £3957, after providing for interest on debenture stock and dividend on the preference stock; and the Directors recommended the payment of a dividend on the ordinary stock, in respect of the half year, at the full statutory rate of 2½ per cent.

Mr. J. G. Frost, the Deputy-Chairman of the Company, who presided, expressed regret at the continued absence through illness of Mr. John Gamon, the Chairman. He said that during the twelve years or more that Mr. Gamon had occupied the chair, the quantity of gas consumed had risen from 166¾ million cubic feet to 230½ million feet; 484 additional ordinary and 4278 prepayment meters had been fixed; and over 5000 additional cookers had been connected. The average price of gas had been reduced by 4d. per 1000 cubic feet; and the charge for meter-rents had been discontinued. Mr. Gamon materially assisted in securing the Company's Act of 1901, and the conversion of the capital of the Company into one uniform stock; but the introduction of the electric light into Chester had been the most important event in the course of his chairmanship, and it was interesting to note the remarkable expansion the Company had experienced since then. The year 1896 was the last year they had without electric light; and in that year they sold 188½ million cubic feet of gas, including the supply of 17½ million feet for public lighting. Last year they only supplied 2½ million cubic feet to public lamps, yet their total sales were 230½ million feet—showing an increase since the introduction of electric light of 22½ per cent.; or excluding the supply for public lighting altogether, the increase was 33½ per cent. on the private supply. Reviewing the past year as a whole, the Company had done remarkably well. For many months they were without the use of a station-meter, so the quantity of gas made was estimated; but they had sold 7¼ million cubic feet more than last year. They had also put in nearly 400 more meters, and close on 600 additional cooking and heating stoves. The expenditure on the works had again been heavy; but this was unavoidable. On the profit and loss account, there was only a sufficient amount to meet the dividends for the half year; but the financial position of the Company was well maintained, and £500 odd had been added to the investments representing the reserve fund. Attention had been called previously to the reserve fund and its investment (under statutory obligation) in Consols. While the fund had not reached the statutory limits, the question of depreciation, by reason of the fall in price of Consols, was not urgent; but, as promised at the last meeting, they had taken the best advice obtainable, and were advised that they were justified in considering the market price of the investment of the fund in Consols to be the actual amount of the fund. As they had not sufficient balance of profits in hand to make up the fund to its legal limit if they wrote down the Consols to to-day's market price, they had this time written down the value of the Consols held on June 30 last to 90; and if Consols had not reached that price at such time as they would be able to fill up the fund, they would be able to write them down to such lower figures as might be the then price of the day. This, of course, was more convenient than writing them down to-day to the lowest figure, and having to write them up again should they rise before they were able to fill up the fund.

The report was adopted and the dividend recommended was agreed to; and thereafter a vote of thanks was passed to the Chairman, Mr. F. A. Pye (the Secretary and General Manager), Mr. J. C. Belton (the Engineer and Works Manager), and the other officers of the Company.

We have received from Messrs. R. D. Wood and Co., of Philadelphia (Pa.), a recently-issued pamphlet on their suction gas power plants, by the use of which they claim a duty of 1 H.P. per hour with the expenditure of 1 lb. of coal.

PROVINCIAL GAS COMPANIES.

The Public Lighting Question at Barnstaple.

A very gratifying report was presented at the annual meeting of the Barnstaple Gas Company last week. Spite of the loss of revenue on account of public lighting, the income of the Company continues to increase, and the undertaking is in a most satisfactory position. Mr. R. Chanter, who presided over the meeting, said that ever since 1904 there had been an increase in the revenue from private consumers; and it had gone up from £6260 that year to £6950 in 1907. The increase last year was £239; but, on the other hand, there was a slight decrease of £53 in the income from public lighting. An increase of £335 in the revenue from sales of coke was very gratifying. The total income for the year was £10,023, against £9467 for the previous year. The cost of manufacture had increased from £5097 to £6072; this being accounted for to some extent by the additional quantity of coal carbonized, and further by the increased price of coal. An expenditure of over £1000 had been incurred in respect of repairs; but notwithstanding this large outlay, the Company finished the year with a profit of £27 more. Mr. Chanter went on to express his gratification with the fact that the Town Council had at last decided to introduce incandescent gas lighting, and said the Company, by agreement with the Corporation, would shortly instal incandescent burners in certain streets. When these burners were in operation, the light would compare very favourably with the electricity in the main streets. The Company had to deal with the fact that the revenue for public lighting had been decreasing year by year; and instead of receiving between £800 and £900, as they did at one time, it had come down to £276. Though the Town Council owned the electricity works, he did not think that was a reason why the Gas Company should not have a chance of competing for the public lighting of a large part of the town; and he was sure that if they had the opportunity, the ratepayers would find there would be a large decrease in the cost. Mr. F. W. Hunt remarked that it was strange the Company had not felt the loss of the public lighting more. This seemed to indicate that they had not made a large profit out of the business. It was worthy of note that Local Government Board Inspectors were calling the attention of local authorities to the economy and efficiency of incandescent gas for street lighting. The report was adopted; and dividends were declared which made, with the interim dividends, a total of 10 per cent. for the year on the "A" shares and 7 per cent. on the "B" shares.

A Satisfactory Balance-Sheet at Leighton Buzzard.

The report which the Directors presented at the annual meeting of the Leighton Buzzard Gas Company last Wednesday stated that the revenue account showed for the year a profit of £2028. This amount, with £776 brought forward from last year's account, made a balance of £2804 standing to the credit of the profit and loss account. Out of this sum, the Board recommended the payment of dividends at the rate of 10 per cent. per annum on the original stock, and 7 per cent. per annum on the new ordinary stock, less income-tax, together amounting to £1732, and that £300 should be carried to the reserve fund; leaving a balance of £772 to be carried forward to the next year's account. Mr. R. Richmond, who presided, said the balance-sheet was a very satisfactory one. The Directors had not found it necessary to increase the price of gas, despite the rise in the cost of coal. He remarked on the fact that the charge for gas had been reduced last year 2d. per 1000 cubic feet. In view of this fact, and having regard to the advance in the price of coal, he thought the present charge for gas must be considered very satisfactory. What the future would bring forth, they did not know. If there was a reduction in the price of coal, he hoped they might be able to make another reduction in the charge for gas. But if the wonderful Eight-Hours Bill came into force, they and all other users of coal would have to look about and consider what they were going to do. The report and dividends were approved; and the Chairman, in proposing a hearty vote of thanks to the Secretary and Manager (Mr. C. F. Ruggles), and the staff, remarked that, when he visited other places, he saw how very favourably the Leighton Buzzard works compared, not only with those in towns of corresponding population, but even with others twice as large.

Gas and Electricity at Malton.

At the recent half-yearly meeting of the Malton Gas Company, the Chairman (Mr. H. W. Pearson), in moving the adoption of the report, remarked that, having regard to the increase of fully 30 per cent. in the price of coal, which had had full effect during the past half year, the balance-sheet must be deemed quite satisfactory, as the Company had actually earned within £50 of the sum required to pay the usual dividend of 6 per cent., free of income-tax. The profits were £1390, and the dividend amounted to £1440. By applying the income of the reserve fund to payment of interest on the mortgage debentures, which it just satisfied, the Company began the current half year with a balance of only £20 less than the last, without having increased the price of gas, which so many companies had done, and been fully entitled to do, having regard to the unprecedented price of coal. One satisfactory feature was that, allowing for the loss of the supply of gas to the Electricity Company, who had established producer-gas plant to drive their dynamos, the general consumption of gas had been more than maintained. There had also been an increasing number of consumers by penny-in-the-slot meters with small cookers. The result of several years' competition with the electric light was that the Company had more than maintained their position in every respect. This was to be attributed to the fact that, under efficient and economical but progressive management, the Company supplied a better light, at less than half the price of electricity; and so long as they did this there was no fear of the continued success of the undertaking. The report was adopted, and votes of thanks were accorded to the Chairman, Directors, and Manager (Mr. H. Tobey).

A Long Coal Contract Advantageous at Newmarket.

At the annual meeting of the Newmarket Gas Company on Monday last week, the Directors reported that the profit earned during the past year was £4613; and that there was a sum of £6467 available for

distribution. They recommended that a dividend at the rate of 6½ per cent. should be paid, and the balance (£2762) carried forward. They stated that the works and plant were in an efficient condition and capable of dealing with any reasonable increase of business. The accounts accompanying the report showed that the revenue for the year was £12,997, of which £8465 was for gas, and the expenditure £8384, of which £4085 was for coal. The Chairman (Mr. R. Stephenson), in moving the adoption of the report and accounts, stated that the Company's earnings during 1907 showed an increase of £316. They had sold slightly more gas, and consumed a little less coal; while the yield of gas per ton of coal showed an increase. The Company had not done so well by £100 with sulphate of ammonia; but £358 more had been received for coke. The Company had about three years ago made a contract for coal, by which they had benefited considerably, and had not been obliged to increase the price of gas. Mr. Stephenson commented upon the Mines' Eight Hours Bill which the Government had promised to introduce, and said that an eight-hour day for miners would have such serious consequences that everything possible should be done to induce the Government not to proceed with the measure. The report was adopted; and votes of thanks were accorded to the Chairman and Directors, and to the Manager and Secretary (Mr. J. H. Troughton).

Increased Consumption at Salisbury.

At the half-yearly general meeting of the Salisbury Gas Company last Wednesday, the Chairman (Mr. G. Fullford), in moving the adoption of the report and the payment of the usual dividends, said the latter had been honestly earned, and it was satisfactory to find the consumption of gas increasing, notwithstanding the extended use of incandescent burners, which consumed much less gas than the flat-flame kind. Satisfactory as the upright incandescent burner was, the inverted form marked a further advance, both as regards economy and adaptability to artistic and decorative purposes. But there was some uncertainty as to the future. Everybody would wish that of all men the coal miner should be well paid for his work; but if the Mines' Eight-Hours Bill became law, the coalowners would not bear the burden alone. It would involve, for gas companies, users of motive power, and what Sir George Livesey called the inarticulate millions who used coal for household purposes, a permanently higher range of coal values. He would only add that the Directors would continue their policy of providing the best article at the lowest practicable cost, and that the scientific knowledge possessed by their Manager (Mr. Norton H. Humphrys, Assoc.M.Inst.C.E., F.C.S.) was always directed to efficient and economical control, both in the interests of the consumers and of the Company. Mr. W. Young seconded the motion, which was unanimously agreed to. A vote of thanks having been accorded to the Chairman, Directors, and staff of the Company for their services during the half year, Mr. S. R. Atkins responded on behalf of the Board, and Mr. Humphrys expressed the acknowledgments of the staff.

Reduction in Price at Scarborough.

At the ordinary general meeting of the Scarborough Gas Company on the 15th inst., the Chairman (Mr. B. Fowler) had the satisfaction of moving the adoption of a very good report on the working of the Company in the year ending the 31st of December. He said there had been continued progress in the business; the sale of gas showing an increase of fully 8½ million cubic feet on the year 1906. The number of consumers was now 10,251, or 233 in excess of those on the books this time last year. The receipts for gas were increased by £939, due to the larger quantity sold. Residuals had realized £684 more, owing chiefly to the higher prices obtained; while the various other items of receipts were £177 in excess of 1906. The total receipts were £1800 more—the actual figures being £54,623, compared with £52,823. On the expenditure side of the accounts, the total was £37,724, against £40,328. The Chairman explained that the increased amount of the latter item was chiefly due to the large expenditure necessitated by the renewal of one of the benches of retorts. As mentioned at the previous meeting, a new department had been formed for the purpose of co-operating with consumers, so that their gas supply, whether for lightiag, heating, or cooking, might give them every satisfaction. He was very pleased to say that the new department had proved a great boon, and had been quite as successful as the Directors anticipated. With the view of meeting the desire of their customers, the Directors had decided to make a reduction, from the end of the March quarter, of 1d. per 1000 cubic feet to the ordinary consumers in Scarborough, and 3d. per 1000 cubic feet to those in Newby and Scalby. They would also reduce the maintenance charge to the Corporation for the public lighting by 3s. per lamp per annum, which would bring down the cost for incandescent street lighting to the lowest rate ever paid by the Corporation. The Directors were gratified to be in a position to make these reductions, especially as a large number of other gas companies had had to increase their price; and he was sure the consumers must feel that their interests received the best consideration of the Board. These changes would decrease the revenue of the Company by something like £2000 per annum. The report was adopted, and dividends at the rate of 5 per cent. per annum were declared upon the three classes of stock, on each of which an interim dividend of 2½ per cent. had been paid for the six months ending June 30. A vote of thanks having been accorded to the Chairman and Directors, the former acknowledged it, and moved that the best thanks of the meeting be given to the Manager and Secretary (Mr. Alex. Allan), the officers, and staff. The motion was heartily carried. In responding, Mr. Allan said he had no hesitation in stating that the whole of the officials had the interests of the Company at heart; and not only the officials, but the workmen also. They all did their work with a will.

A Good Increase at Wakefield.

The accounts presented at the half-yearly general meeting of the Wakefield Gas Company on Monday last week showed that the revenue in the six months ending the 31st of December last was £22,727, of which £15,681 was for gas and £5283 for residual products. The expenditure amounted to £17,241, of which £11,591 was for the manufacture of gas (£6756 being for coal) and £2295 for distribution. The balance carried to the profit and loss account was £5486; and the amount available for distribution was £10,406. The Chairman (Dr. Statter), referring to the accounts, said the Directors were glad to submit a satisfactory balance-sheet. There had been an increase of about 8¾ million cubic feet in the quantity of gas sold during the past year. So far they had not raised their price; but, owing to the state of the coal market, they were afraid the high rates at present ruling would act prejudicially in the current half year. The prepayment meters maintained their popularity; nearly 2 million pennies having been received from this source during the twelve months. With regard to residuals, tar and ammoniacal liquor had not realized quite so much as before; and it seemed very probable that the price of tar especially would be much lower in the near future. The other items in the accounts were about the average. He concluded by moving the adoption of the report and accounts. Mr. White seconded the motion; and it was carried. A resolution was then passed authorizing the payment of the prescribed rate of interest on the 4½ per cent. preference stock and the following dividends: £5 15s. per cent. on the £25 and £5 shares respectively, £4 10s. per cent. on the £5 B-5ths shares, and £4 5s. per cent. on the new ordinary £10 shares—the balance being carried to next account. A hearty vote of thanks was passed to the Chairman for presiding, and to the Directors for their attention to the business of the Company. After acknowledging it, the Chairman proposed a similar vote to the Engineer (Mr. H. Townsend), the Secretary (Mr. W. H. Parker), and their respective staffs; and it was heartily accorded.

Good Progress and Reduced Price at Wellington (Salop).

At the annual meeting of the Wellington (Salop) Gas Company last Tuesday, the Chairman (Mr. H. Shepard), in moving the adoption of the report and accounts, which showed that the revenue in 1907 was £9042 and the expenditure £6230, leaving a surplus of £2812, remarked that the past year had been one of extraordinary progress. The Company began by making a reduction in the price of gas, and they made a very important concession to the Urban District Council. The business of the Company continued to extend. The small discount meters had helped the Company in regard to stoves, &c.; and the Directors were able to present to the shareholders a report which he hoped would be regarded as highly satisfactory. In spite of the increased price of coal and other circumstances, the Company had been able to maintain their plant in a thoroughly efficient state. Taking the profit and loss account, after paying the December half-year's dividend there remained £2730. He had had the honour of being a Director of the Company for some 27 or 28 years, and within the last eight or ten years the concern had advanced by leaps and bounds, which was, no doubt, due to the fact that the Company were able to supply gas at so low a price. As showing the progress made during the past year, the gas produced amounted to 47·75 million cubic feet, compared with 43·33 millions in the previous year. The quantity of coal carbonized was 4198 tons, against 3838 tons. The gas made per ton of coal was 11,402 cubic feet, compared with 11,303 cubic feet; and the quantity of gas sold was 43 millions, against 39½ millions, or an increase of 9 per cent. This quantity was made up as follows: Gas for power, 1,000,000 cubic feet; cookers and fires, 600,000 cubic feet; lighting, 1,200,000 cubic feet; slot consumers, 300,000 cubic feet. As showing the growth of the Company's business during the last ten years, he might mention that the quantity of gas made had increased by 74 per cent.; the figures being: In 1897, 27,476,000 cubic feet; in 1907, 47,869,000 cubic feet. This was very remarkable in a small town like Wellington, where they had only a limited area to work upon; and to increase to such an extent in ten years was an extraordinary achievement. The Directors contemplated spending more money on additional plant; and in the next ten years, if the increase continued in the same way that it had done during the last decade, they would require much larger works. In spite of the high price of coal and the low prices of residuals, the Directors proposed a further reduction in the price of gas for lighting of 2d. per 1000 feet to consumers of less than 250,000 feet per annum, making the price 3s. 4d. instead of 3s. 6d.; 1d. per 1000 feet to consumers of 250,000 cubic feet and less than 1,000,000 feet per annum, making the price 3s. 2d. instead of 3s. 3d.; and 2d. per 1000 feet to consumers of more than 1,000,000 feet, making the price 3s. instead of 3s. 2d. This reduction would take effect as from the 1st ult. Such a reduction had been made by very few gas companies in the country this year; and he hoped the action of the Wellington Company would result in more gas being consumed. The Chairman concluded by remarking that it had occurred to him that it would be a good thing if the Wellington and Oakengates Companies were amalgamated, with a Joint Board. There was no reason at all why this should not be done, as it would be to the advantage of all concerned. At all events, it was worthy of consideration by the Directors of the Oakengates Company; and he did not see why they could not work together for the benefit of shareholders and consumers. The report was adopted, and a dividend at the rate of 5 per cent. per annum was declared.

Chard Water Supply.—After much controversy and the expenditure of a large sum of money, the question of the water supply of Chard is still causing anxiety to the Town Council of the borough. Some months ago, boring operations were begun on Snowdon Hill near the town, with a view to finding water which might be pumped to a reservoir situated at a convenient height for the supply of the borough. The boring reached a depth of 205 feet without the discovery of water in any great volume. In view of this disappointment, the Engineers (Messrs. Bailey-Denton, Lawford, and Symons) came to the conclusion that a fault had been struck in the strata, and at their suggestion Mr. W. Whitaker was called in to make a geological survey. He has pointed out to the Corporation that since the commencement of the boring operations a new Geological Survey map has been issued, which shows a fault running in proximity to the spot selected for the experiment. He advises, however, that the boring should be continued for a further depth of 50 feet, and expresses the opinion that there is every probability of success being achieved. The boring is therefore to go on, though many members of the Corporation are doubtful as to the result.

COMMERCIAL GAS COMPANY.

The Half-Yearly Report and Accounts.

The following is the report the Directors of the Company will present at the half-yearly meeting on Thursday.

The revenue account shows a net profit for the half year of £64,037 8s. 8d., which, added to the balance of £23,505 9s. 5d. brought forward from last year, produces a net revenue balance of £87,540 18s. 1d. Deducting therefrom £8877 13s. 6d. for interest, there remains standing to the credit of the net revenue account a balance of £78,663 4s. 7d. available for dividend. The Directors recommend the payment of dividends thereout at the rates of £5 4s. per cent. per annum upon the 4 per cent. stock of the Company, and of £5 per cent. per annum upon the 3½ per cent. stock, both less income-tax. The balance of the net revenue will be carried forward to the next half year.

The accounts accompanying the report consist of the usual statements. They show that the paid-up stock on the 31st of December amounted to £976,405; that £1,076,875 had been added by conversion, making £2,053,280; and that £170,698 remained unissued out of the total authorized capital (including premiums) of £2,235,000. The total amount borrowed on the above-named date was £339,062 10s., and £135,937 10s. was added by conversion; making a total of £475,000, and leaving £79,226 to be borrowed out of the £550,000 authorized. The receipts on capital account amount, with premiums, to £2,584,665 4s. 5d. The expenditure stands at £1,408,122 8s. 2d., with a nominal amount of £1,212,812 10s. added by conversion—together £2,620,934 18s. 2d. There is consequently a balance of £36,269 13s. 9d. carried to the balance-sheet. The expenditure on capital account in the half year was £11,238, apportioned as follows: New and additional mains, services, &c., £2594; stoves, £3528; prepayment meters and fittings, £5116. The reserve fund amounted at the close of the year to £34,696; and the insurance fund to £33,125. The following is the revenue account:—

Expenditure.

Manufacture of gas—		
Coal and oil, including dues, carriage, unloading, and trimming	£107,664 3 11	
Salaries of Engineer and officers at works	2,192 4 2	
Wages (carbonizing)	17,575 10 6	
Purification, including labour	1,830 16 5	
Repair and maintenance of works and plant, materials and labour, less £244 3s. 6d. received for old materials	21,713 1 1	
		£151,975 16 1
Profit sharing		2,240 2 10
Distribution of gas—		
Salaries and wages of officers and rental clerks	£3,903 15 6	
Repair, maintenance, and renewal of mains and services, material and labour	6,432 2 0	
Repair and renewal of meters	2,411 10 1	
,, ,, ,, ,, stoves	7,836 18 7	
,, ,, ,, ,, prepayment meters and fittings	8,439 0 7	
Incandescent mantle maintenance, &c.	487 11 7	
		29,511 7 4
Public lamps—lighting and repairing		2,637 11 8
Rent, rates, and taxes		12,066 18 4
Management—		
Directors' allowance	£1,250 0 0	
Company's Auditors	75 0 0	
Salaries of Secretary, Accountant, and clerks	1,156 2 4	
Collectors' salaries and commission	1,634 2 5	
Prepayment meter collection	2,415 12 5	
Stationery and printing	1,022 14 5	
General charges	1,830 12 7	
		9,384 4 2
Bad debts		1,076 12 6
Law and parliamentary charges		141 13 4
Superannuations and allowances		1,174 1 8
Official officers, &c.		142 11 5
Total expenditure		£210,950 19 4
Balance carried to net revenue account		64,037 8 8
		£274,988 8 0

Receipts.

Sale of gas—		
Common gas per meter at 2s. 6d. per 1000 cubic feet (86,502)	£195,173 2 4	
Public lighting and under contracts, common gas	5,815 18 7	
	£201,989 0 11	
Less discounts and allowances	3,248 7 0	
		£198,740 13 11
Rental—		
Meters (24,054)	£2,862 3 8	
Stoves (50,662)	8,088 9 6	
Prepayment meters (61,660)	13,165 8 0	
Incandescent mantle maintenance	478 14 2	
		24,594 15 4
Residual products—		
Coke, less £3897 2s. 2d. for labour	£32,321 11 11	
Breeze, less £634 17s. 11d. for labour	2,372 11 6	
Tar	7,336 15 5	
Ammoniacal liquor and sulphate of ammonia	9,525 1 10	
		51,556 0 8
Miscellaneous receipts—		
Rent receivable	£62 18 1	
Transfer fees	34 0 0	
		96 18 1
Total receipts		£274,988 8 0

The following are the statements relating to the manufacturing operations of the Company in the half year:—

Statement of Coals and Oil.

Description.	In Store June 30, 1907.	Received During Half Year.	Carbonized During Half Year.	Used and Sold During Half Year.	In Store Dec. 31, 1907.
	Tons.	Tons. cwt.	Tons. cwt.	Tons.	Tons.
Common	17,981	106,335 7	99,093 7	532	24,691
Cannel	1,142	..	..	..	1,142
Total	19,123	106,335 7	99,093 7	532	25,833
Oil—gallons	358,905	1,427,703	1,443,934	..	342,674

Statement of Residual Products.

Description.	In Store June 30, 1907.	Made During Half Year.	Used During Half Year.	Sold During Half Year.	In Store Dec. 31, 1907.
Coke—tons	2,498	60,694	13,033	42,933	7,226
Breeze—tons	1,930	13,705	..	11,847	3,788
Tar—gallons	496,422	1,241,237	..	953,477	784,182
Ammoniacal liquor—butts	8,406	30,401	33,413	..	5,394
Sulphate of ammonia—tons	150	1,061	..	1,076	135

Statement of Gas Made, Sold, &c.

Quantity Made (meter register and estimated).	Quantity Sold.		Quantity Accounted for.	Number of Public Lights.
	Public Lights and under Contracts (estimated).	Private Lights, per Meter.		
Thousands.	Thousands.	Thousands.	Thousands.	
1,732,471	38,776	1,571,135	1,636,468	4015

The remaining statement is the balance-sheet, which gives the value of the stores in hand at the close of the past year as follows: Coal, oil, &c., £25,682; coke and breeze, £5215; tar, ammoniacal liquor, sulphate of ammonia, &c., £9003; sundry stores, £35,044—total, £74,944. A sum of £13,568 stands in the balance-sheet as employees' bonus and savings.

SUTTON-IN-ASHFIELD GAS-WORKS.

Contemplated Extensions.

Mr. F. J. Willis held an inquiry at Sutton-in-Ashfield last Wednesday relative to an application by the Urban District Council for a Provisional Order empowering them to materially enlarge the gas undertaking and modify existing Orders to enable them to do so.

The Clerk (Mr. J. D. Fidler) stated that the gas-works were first established by the Sutton Gaslight and Coke Company, under a Provisional Order of 1874; and in 1878 they were sold to the old Sutton Local Board for £30,313. Since then a loan of £7000 had been raised on the works; but this had been repaid, and the outstanding loans at present amounted to £39,299. When the works were first built, Sutton was comparatively small; and naturally a small quantity of gas was then supplied. The place had, however, since grown; and the result was that the retort-house was now situated in a most unsuitable position. The Council had been enabled to purchase some land behind the present gas-works which was suitable for the proposed extensions; and they were also in negotiation with the Duke of Portland with a view to purchasing some more land to enable them to construct a siding to the Great Northern Railway, so that coal, &c., could be delivered direct into the yard. The Council proposed to sell the land where the present retort-house stands for building purposes; and they hoped to realize thereby capital which would assist them in the cost of the transfer of the works. The Huthwaite Urban District Council had applied to the Sutton Council to supply them with gas in bulk; and believing that it would be beneficial to both, the Sutton Council asked for powers to do so. Kirkby-in-Ashfield, having built their own works, paid in 1905 to the Sutton Council a sum of £13,234 for mains, goodwill, &c.; and the following year the latter Council obtained a Provisional Order enabling them to repay loans to the extent of £3444 out of this sum. They had in hand at the present time £9683, which they were asking for powers to use in the carrying out of their proposed alterations.

Mr. Corbet Woodall, who is Engineer for the scheme, explained the nature of the proposals. He pointed out that, though the retort-house would have to be sacrificed, all the machinery could be removed to the new site. There was no room for extensions on the present site, which was very inconvenient and crowded.

RESTRICTING THE HOURS OF LABOUR.

As briefly mentioned last week, a Bill has been introduced by Mr. Will Thorne to "restrict the hours of labour in all trades and industries to eight per day." It is a very short measure, consisting of only four principal clauses. In the first it is proposed that on and after the 1st of January next "no person shall work, or cause or suffer any other person to work on sea or land in any capacity under any contract or agreement, or articles for hire of labour, or for personal service on sea or land (except in case of accident), for more than eight hours in any one day of 24 hours, or for more than 48 hours in any week." Under the second clause, any employer, manager, or other person, who shall knowingly cause or suffer anyone subject to his or her authority or commands, or in his or her employment, to work on sea or land in any capacity under any contract or agreement or articles for hire of labour, or for personal service (except in case of accident) for more than the time above specified, shall, on conviction, be liable to a penalty of not less than £100 and not more than £500 for every such offence. All offences under the Act, and all money and costs directed by the Act to be recovered as fines, may, by clause 3, be prosecuted and recovered in manner directed by the Summary Jurisdiction Acts before a Court of Summary Jurisdiction; and under the next clause summary orders under the Act may be made on complaint before a Court of Summary Jurisdiction.

A winding-up order has been made in the case of the London Gas Mantle Manufacturers, Limited, of Fitzgerald Avenue, Mortlake.

COAL MINES (EIGHT HOURS) BILL.

Memorial of the Institution of Gas Engineers.

Mr. W. T. Dunn, the Secretary of the Institution of Gas Engineers, has sent a copy of the following memorial, which has been forwarded, on behalf of the Council, to the Home Secretary, against the passing of the Miners' Eight Hours Bill.

To The Right Hon. W. H. Gladstone, M.P.,
Secretary of State for the
Home Department.

Feb. 20, 1908.

SIR,—On behalf of the Council of the Institution of Gas Engineers—an Institution which is representative of the entire gas industry throughout the United Kingdom—we, the undersigned, respectfully ask leave to represent to you the serious consequences which are likely to result to gas undertakings through the passing into law of the proposed Coal Mines (Eight Hours) Bill. Coal is the principal raw material of gas manufacture, and upwards of fifteen million tons are annually consumed for that purpose. It is essential for the well-being of the industry that the price of coal should be as low as is consistent with a just regard for the interests both of coal owners and coal miners; and especially for the safety and convenience of the latter. We do not, however, know of any conditions attending coal mining which make it necessary for the Legislature to intervene with restrictions upon the liberty which the miners now enjoy, of working as many hours as may suit them, or be agreed upon between them and their employers. During recent years the price of coal has from various causes been appreciably increased, with the result that the price of gas has also in many cases had to be increased. We are apprehensive of a further advance in the price of coal should the Bill become law, the effect of which would be to increase the cost of gas to many millions of consumers, the larger proportion of whom are of the artizan and labouring class, whose cost of living would be thereby greatly increased.

We therefore venture to ask you to receive a deputation from the Council on the subject, and beg to remain,

Your obedient servants,

(Signed) W. DOIG GIBB, President.
L. S. S. Y. SHOUBRIDGE, Hon. Secretary,
WALTER T. DUNN, Secretary.

Meeting of Consumers at Newcastle.

On Monday of last week, a meeting of coal consumers (called by the Chamber of Commerce) was held at Newcastle-on-Tyne to consider the Coal Mines (Eight Hours) Bill.

Alderman Sir W. H. Stephenson, who presided, said he thought strong representations had been made to the Home Secretary by the coalowners themselves, who showed the inconvenience, as well as the loss, that would follow the adoption of the proposed eight hours day for miners. He believed it was said the Home Secretary was rather surprised that no appeal had been made to him from the consumers of coal. The Bill would affect the consumers of coal to a very great extent. He was old enough to remember that in 1872 the Government of that day introduced a new regulation into the working of coal mines—the Coal Mines Regulation Act. The price of coal went up immediately; and they had the boom of 1872—a boom such as there had never been before or since. The price of coal, owing to that action, had been permanently increased; and the same result, he had no doubt, would follow if the hours of labour were restricted as was proposed. He was a coalowner, and a consumer in his representative capacity as Chairman of the Newcastle and Gateshead Gas Company. This Company consumed and carbonized more than 300,000 tons of coal a year; and, if they had to pay 2s. a ton more for their coal in perpetuity, they would have to fall back upon their constituents—the consumers—to recoup themselves for the additional cost.

A number of other speakers expressed the view that serious consequences to consumers would attend the passing of the measure. Alderman Richardson remarked that he had had a conversation with some colliery owners; and they informed him that, to the best of their reckoning, they could not expect less than a short output of some 20 per cent. There was very little work in the factories just now. There was a lack of orders; and the cost of production was high. If the Bill should be passed, it would benefit the miner to the depreciation of the labour of his fellow-workmen throughout the country, and would increase the ranks of the unemployed. Mr. Renwick said the result of the Bill would undoubtedly be to increase the cost of coal; and this at the present time was quite high enough. The demand for coal increased more rapidly than the output; and they might reckon in a few years, owing to the restriction, and the natural increase in the demand, upon having to pay much higher prices than they were paying to-day. Their opposition was strengthened by the fact that the miners themselves were not unanimous in their advocacy of the Bill. Mr. Davidson urged that the Bill would cripple industry and deter capital; while Sir Walter Runciman, Bart., said he believed no Government had any right to bring forward measures that were likely to act to the detriment of the general public.

The following resolution was carried unanimously: "That this meeting is of opinion that any further restrictions in the hours of labour in coal mines would be injurious to many industries depending upon the supply of coal, and will thus inflict a hardship on the manufacturers and industrial classes generally and domestic consumers; and that a deputation be sent to the Home Secretary to place their views before him." The appointment of the deputation was left to the Secretary and the Sub-Committee of the Chamber of Commerce.

NOTES FROM SCOTLAND.

From Our Own Correspondent.

Saturday.

The controversy in Selkirk over the proposed gas transfer is very keen. Although there was only one dissentient member of the Town Council—Bailie Reekie—when it was resolved to recommend that the Gas Company's offer to accept £16,326 be agreed to, there is opposition outside the Council, which is most probably the work of only a few persons; but whether they be few or many, they are most active, pronounced, and persistent, and are not without weight in the community. There is one newspaper published in Selkirk; and it is favourable to the transfer. There is another newspaper, published in Galashiels, which is not favourable; and its columns are being made use of in the way of retarding negotiations. There was considerable feeling among the councillors at finding that what was transacted at a private meeting of the Council was promptly reported in the opposition newspaper. It was this premature publication which led to the issue by the Town Council of the official statement, the leading points of which I gave last week; it being considered advisable that the public should not go to the meeting which had been called with their minds filled with the views of only one side. The public meeting was held on Monday evening. Provost Sim presided, and gave a long and detailed account of the proceedings which had led up to the present situation. Then he replied to the criticisms which had been made upon the proposal to acquire the Company's undertaking, pointing out that the opposition had been hopelessly astray in all their calculations. If they were going to get gas as cheap as they had, they should certainly take over the Company. Bailie Reekie voiced the opposition. He twitted the Provost and his party with being in a hurry to effect a transfer. The share capital of the Company was £4535, made up of 907 shares of £5 each. They were going to give the Company £18 per share, or £13 more than their original value. In the official statement, he went on to say, it had been omitted to state that the Company were about to expend £2000 upon the erection of a new gasholder. Immediately they acquired the undertaking, the Council would have to spend this sum. Councillor Roberts said that they had obtained an offer from the Company which would not be repeated; and he was perfectly satisfied that, under arbitration, they could not acquire the undertaking at anything like the figure for which they could get it now. Mr. S. Muir, a ratepayer, said he had it on the authority of the Chairman of the Gas Company, and also on the authority of several influential members of the Gas Company, that the Directors were willing to consider some proposal for an agreement in which they would consent to restrict their dividend. This statement somewhat complicated matters, and doubtless added to the strength of the opposition, the supporters of which were found, on a show of hands being taken, to be about equal to the supporters of the transfer. Arrangements have since been made for taking a poll of the ratepayers on the subject. But before the poll is taken, the Town Council, at a special meeting held on Thursday, resolved that the Company be asked whether the statement made by Mr. Muir was accurate, and, if so, to say what arrangement the Directors would suggest, in order that the ratepayers may have an opportunity of considering the proposals of the Directors as well as the recommendation of the Council.

The Dundee gas scandal was discussed in the Town Council on Thursday at some length. It will be remembered that two Committees were appointed to consider the subject; the second being at the instigation of the clerks in the department of the Gas Treasurer. The original Committee reported recommending certain changes in the working of the gas office. Mr. Scrymgeour, in the Council, moved disapproval of the Committee's report. He contended that they never faced the question at issue, but deliberately shuffled the responsible task placed upon them; the Gas Treasurer—Mr. A. W. Stiven—holding a combined office, was not able to supervise them both; and that influences had been at work in the interests of certain men in the Gas Office. The recommendations of the Committee were adopted by 23 votes to four. The Council then took up consideration of the action of the second Committee, speaking to which, Treasurer Urquhart said that when the requisitionists (the clerks in the office) were examined, they were pinned down to certain specific charges; and the Committee, realizing that there were elements in them of the nature of a criminal charge, came to the conclusion that all these matters should be remitted to the Procurator-Fiscal for inquiry. The Procurator-Fiscal had reported the evidence he had collected to Crown Counsel; and the Committee had, in these circumstances, come to the resolution that they should be dissolved, pending the result of the proceedings of the criminal authorities, after which the Council might of new appoint the Committee or a new one. Mr. Soutar considered that the Council went altogether off the rails in appointing either of the Committees. They found from the minutes that, immediately the disappearance of the money was discovered, the detective department was communicated with. As soon as the Committee got to work, the police came to the conclusion that the matter was taken out of their hands. Through the humbugging of the two Committees, the police refrained from action at a most important period. Treasurer Urquhart, in reply to a question, said that some of the charges made by the clerks were found to be old, and some new; and the Committee, recognizing them to be of a criminal nature, resolved to hand them over to the Procurator-Fiscal. On a division, Treasurer Urquhart's motion for approval of the action of the Committee was adopted by 22 votes to three.

The matter of the liquidation of Messrs. Bruce Peebles and Co., Limited, was brought before the First Division of the Court of Session on Tuesday morning. Counsel stated that, on the petition of the Company, a Provisional Liquidator had been appointed by the Lord Ordinary on the Bills; and the motion made by Counsel was that the Court restrict the caution to be found by that official. The sum of £10,000 was suggested, which was the amount the Provisional Liquidator was authorized by the Lord Ordinary to borrow for the carrying on of the business. The Provisional Liquidator will be superseded on the 24th inst., when the shareholders meet. The Court granted the motion. In their petition to the Lord Ordinary, the

Company say they were incorporated on June 24, 1903. During the first four years, the Company were successful in business and paid substantial dividends on both classes of shares, besides setting aside considerable sums to reserve. In the past year, however, being in need of further capital for the large contracts which they had on hand, the Company suffered severely from the extreme stringency of the Money Market, which made it impossible for them to raise—as had been intended, and as was authorized by the shareholders early in 1907—further capital. In order to secure contracts, the Company have (in common with other similar undertakings) all along had to take part payment in shares and debentures of companies for which they did work. The securities which the Company had thus come to hold would, it was hoped, ultimately be realizable at reasonable prices; but in the recent period of depression it was found impossible to realize them to advantage. Consequently the Company had found it impossible to provide cash to meet the claims of creditors, and to carry on business. Several creditors were now pressing for payment; and it had become necessary, in order to prevent a race for diligence, to apply to the Court for a winding-up order. The Company have a valuable business and goodwill, and it is expected that it can be reconstructed, in the interests and to the advantage of both the creditors and shareholders.

In September last, the Melrose Gas Company, Limited, appealed to the County Valuation Committee against their undertaking being valued at £456, and asked that it be reduced to £248. On that occasion the Assessor defended his valuation by the argument that, on the usual basis, the figure ought to be £248; but he found that there had been an exceptional decrease in the profits, and he had taken an average of the profits for the previous five years. The County Committee upheld the Assessor's view; and the Company appealed to the Valuation Appeal Court, which sat in Edinburgh this week—Lord Low and Lord Dundas presiding. The Company maintained that only the profits of the preceding year should be taken into account, and pointed out that their revenue had gone down since electric lighting was introduced. The Assessor contended that his method was right, because, in the words of the Statute, the subject had to be valued at the rent at which, "one year with another," it might be reasonably expected to let "from year to year." The Court refused the appeal. Lord Low said he had no doubt the Assessor was perfectly right in arriving at his valuation by taking the results of trading upon an average of years, because, as was pointed out by Lord Fraser in the Falkirk case, in a judgment which had been held to establish the general rule that a hypothetical tenant, in considering what price he would give, would ascertain what had been the earnings of the subject for an average of years. He was further of opinion that a period of five years was one which was very generally recognized in practice as one which gave a fair average. The only difficulty he felt in this case was that in the five years was included the year 1904, when the Company seemed to have earned an abnormally large income. A change of circumstances occurred after that year, which prevented them earning subsequently anything approaching what they did then. There might again be a change of circumstances, which would increase their income, even up to the amount of the year 1904. This was a point upon which they could not speculate; and, although he had a good deal of sympathy with the objections taken by the appellants to that year being included in the average, he thought it would probably give room for questions and trouble in the future if they gave effect to that view. So that he was of opinion they should simply hold that the determination of the County Committee was right. Lord Dundas concurred.

The Lord Provost's Committee of the Edinburgh Town Council on Wednesday, thinking better of the matter, agreed to recommend that apparatus for testing the electric light current be placed in the City Chambers, and be under the direction of the Gas Examiner; thus bringing the electric light under the same control as the gas.

CURRENT SALES OF GAS PRODUCTS.

LIVERPOOL, *Feb.* 22.

Sulphate of Ammonia.

The market remains without any material alteration. Buying has been sustained, but supplies have been sufficient and freely offered, and there has been no change in values. The closing quotations, consequently, remain £11 17s. 6d. per ton f.o.b. Hull, £12 per ton f.o.b. Liverpool, and £12 2s. 6d. per ton f.o.b. Leith. Prompt prices would also be paid for March, but for delivery further ahead buyers are not much interested. Makers, however, are not inclined to sell for forward delivery, unless at a premium on spot values; and, consequently, there is not much business being done.

Nitrate of Soda.

This article is steady at 11s. 3d. per cwt. for 95 per cent, and 11s. 4½d. for refined quality.

LONDON, *Feb.* 24.

Tar Products.

The market for pitch continues very dull; and though prices are no lower, the market certainly cannot be considered to be any better than was the case a week or two ago. Orders for both prompt and forward delivery are difficult to obtain. Prices which are offered for delivery over next season are too low to interest dealers at present; while Continental pitch is known to have been sold at very low figures. Creosote continues quiet, without any material alteration in the prices. For prompt delivery, reasonable figures would be accepted; but for forward, makers are firm in their ideas. Benzol 90 per cent. is quiet. Business is reported to have been done in the North at under 8d. per gallon; while in London sales are reported at 8¼d., delivered at consumers' works. Solvent naphtha remains in about the same position. Business has been done at 10¼d. in London for country makes. Carbolic acid is steady, as although Continental consumers refuse to pay more than 1s. 6½d. f.o.b. east coast ports, there are still buyers at 1s. 7d. for prompt delivery. Creosote salts are firm, and there is still a good demand for same. In anthracene, a small parcel has been sold at 1½d. per gallon.

The average values during the week were: Tar, 12s. 6d. to 16s. 6d. *ex* works. Pitch, London, 20s. to 20s. 6d.; east coast, 19s. 9d. to 20s.; west coast, 18s. 6d. to 19s. 6d. Benzol, 90 per cent., casks included, London 8½d. to 8¾d., North 8d. to 8¼d.; 50-90 per cent., casks included, 8d. to 8¼d. North and London. Toluol, casks included, North 8½d. to 9d., London 9¼d. to 9¾d. Crude naphtha, in bulk, London 3¾d. to 4d., North 3½d. to 3⅝d.; solvent naphtha, casks included, North 9d. to 10d., London 10d. to 10¼d.; heavy naphtha, casks included, London 11d. to 11½d., North 10d. to 10½d. Creosote, in bulk, London 2½d. to 2⅝d.; North 2¼d. to 2½d. Heavy oils, in bulk,

GAS COMPANIES' STOCK AND SHARE LIST.

Referred to on p. 471.

Issue.	Share.	When ex-Dividend.	Dividend or Dividend & Bonus.	NAME.	Closing Prices.	Rise or Fall in Wk.	Yield upon Investment.
£			p.c.				£ s. d.
590,000	10	Oct. 11	10½	Alliance & Dublin 10 p.c.	20—21	+⅛	5 0 0
268,324	10	,,	7½	Do. 7 p.c.	14—15	..	5 0 0
310,000	Stk.	Jan. 16	4	Do. 4 p.c. Deb.	98—100	..	4 0 0
200,000	5	Oct. 30	7	Bombay, Ltd.	6¼—6⅝	..	5 3 8
40,000	5	,,	7	Do. New, £4 paid	4½—5	..	5 12 0
50,000	10	Aug. 29	14	Bourne- mouth Gas and Water	10 p.c.	..	4 18 3
51,810	10	,,	7		B 7 p.c.	..	4 2 4
53,200	10	,,	6		Pref. 6 p.c.	..	3 17 5
380,000	Stk.	Aug. 15	12½	Brentford Consolidated	247—252	..	4 19 2
300,000	,,	,,	9½	Do. New	185—190	..	5 0 0
50,000	,,	,,	5	Do. 5 p.c. Pref.	120—125	..	4 0 0
206,250	,,	Dec. 13	4	Do. 4 p.c. Deb.	100—105	..	3 16 2
220,000	Stk.	Sept. 27	11½	Brighton & Hove Orig.	203—210	..	5 7 1
246,320	,,	,,	8½	Do. A. Ord. Stk.	155—160	..	5 3 2
460,000	20	,,	10	British	42½ - 43½	..	4 11 11
104,000	Stk.	Feb. 13	6	Bromley, Ord. 5 p.c.	116—119*	..	5 0 10
165,700	,,	,,	4½	Do. do. 3½ p.c.	86—89*	..	5 1 2
500,000	10	Oct. 11	7	Buenos Ayres (New) Ltd.	11½—12	..	5 16 8
250,000	Stk.	Dec. 13	4	Do. 4 p.c. Deb.	93—95	..	4 4 3
150,000	20	July 12	7½	Cagliari, Ltd.	26—27	..	5 7 5
100,000	10	—	—	Cape Town & Dis., Ltd.	4—6	−2	—
100,000	10	Apl. 26	4½	Do. 4½ p.c Pref.	7—9	..	5 0 0
50,000	50	Nov. 2	6	Do. 6 p.c. 1st Mort.	48—50	..	6 0 0
100,000	Stk.	Dec. 30	4½	Do. 4½ p.c. Deb. Stk.	92—94	..	4 15 9
157,150	Stk.	Aug. 15	5	Chester 5 p.c. Ord.	108—110	..	4 10 11
1,493,280	Stk.	,, 29	5⅛	Commercial 4 p.c Stk.	105—110	+1	4 14 6
560,000	,,	,,	5	Do. 3½ p.c. do.	101—106	..	4 14 4
475,000	,,	Dec. 13	3	Do. 3 p.c. Deb. Stk.	82—84	..	3 11 5
800,000	Stk.	,,	6½	Continental Union, Ltd.	115—120	+2	5 8 4
200,000	,,	,,	7	Do. 7 p.c. Pref.	137—142	..	4 18 7
460,170	Stk.	—	5⅜	Derby Con. Stk.	122—123	..	4 9 5
55,000	,,	—	4	Do. Deb. Stk.	103—105	..	3 16 2
148,995	,,	—	—	East Hull 5 p.c. Ord.	101—104	..	—
486,090	10	Jan. 30	12	European, Ltd.	23—24	+½	5 0 0
354,060	10	,,	12	Do. £7 10s. paid	16½—17½	..	5 2 10
15,182,590	Stk.	Feb. 13	4⅛	Gas- 4 p.c. Ord.	97—98*	−½	4 9 9
2,600,000	,,	,,	3⅜	light 3½ p.c. max.	86—88*	..	3 19 7
3,799,735	,,	,,	4	and 4 p.c. Con. Pref.	105—108*	+1	3 14 1
4,193,975	,,	Dec. 13	3	Coke 3 p.c. Con. Deb.	82—84	..	3 11 5
258,740	Stk.	Sept. 13	5	Hastings & St. L. 3½ p.c.	93—98	..	5 2 0
82,500	,,	,,	6½	Do. do. 5 p.c.	114—117	..	5 11 1
70,000	10	Oct. 11	11	Hongkong & China, Ltd.	19—20	..	5 10 0
4,940,000	Stk.	Nov. 14	8	Imperial Continental	179—182	−1	4 7 11
473,600	Stk.	Feb. 13	3⅜	Do. 3½ p.c. Deb. Red.	92—94*	..	3 14 6
195,242	Stk.	Aug. 29	6	Lea Bridge Ord. 5 p.c.	115—120	..	5 0 0

Issue.	Share.	When ex-Dividend.	Dividend or Dividend & Bonus.	NAME.	Closing Prices.	Rise or Fall in Wk.	Yield upon Investment.
£			p.c.				£ s. d.
551,000	Stk.	Aug. 29	10	Liverpool United A	223—225	..	4 8 11
718,100	,,	,,	7	Do. B	164—166	..	4 4 4
306,083	,,	Dec. 30	4	Do. Deb. Stk.	106—108	..	3 14 1
152,736	Stk.	Feb. 13	7⅞	Maidstone 5 p.c.	136—141*	..	5 8 2
75,000	5	Nov. 28	5	Malta & Medn., Ltd.	4¼—4⅜	..	5 5 3
560,000	100	Oct. 1	5	Met. of 5 p.c. Deb.	101—103	..	4 17 1
250,000	100	,,	4½	Melbourne 4½ p.c. Deb.	10:—103	..	4 7 5
541,920	20	Nov. 14	3½	Monte Video, Ltd.	10¾—11⅛	..	6 1 9
1,775,892	Stk.	Aug. 15	4⅝	Newc'tle & G'tesh'd Con.	108—109	+⅛	4 4 10
418,463	Stk.	Dec. 30	3⅜	Do. 3½ p.c. Deb.	86—88	..	3 19 7
15,000	10	Aug. 29	10	North Middlesex 10 p.c.	19½—20½	..	4 17 7
55,940	10	,,	7	Do. 7 p.c.	13—14	..	5 0 0
300,000	Stk.	Nov. 28	8	Oriental, Ltd.	140—143	+1	5 11 11
60,000	5	Sept. 13	7	Ottoman, Ltd.	6—6⅛	..	5 7 8
398,490	5	Oct. 30	7	Primitiva Ord.	6¾—7¼	..	4 16 7
796,980	5	Jan. 30	5	Do. 5 p.c. Pref.	4⅞—5⅛	..	4 17 7
488,900	100	Dec. 2	4	Do. 4 p.c. Deb.	93—95	..	4 4 3
1,000,000	10	Oct. 11	8	River Plate Ord.	13½—14	..	5 14 4
312,650	Stk.	Dec. 30	4	Do. 4 p.c. Deb.	93—95	..	4 4 3
250,000	10	Sept. 27	8	San Paulo, Ltd.	13—13⅛	..	5 18 6
125,000	50	Jan. 2	5	Do. 5 p.c. Deb.	49—51	..	4 18 0
135,000	Stk.	Sept. 13	10	Sheffield A	245—247	..	4 1 0
209,984	,,	,,	10	Do. B	245—247	..	4 1 0
523,500	,,	,,	10	Do. C	245—247	..	4 1 0
70,000	10	Nov. 14	10	South African	14⅜—15⅜	..	6 9 0
6,429,895	Stk.	Feb. 13	5⅜†	South Met., 4 p.c. Ord.	121—123*	+½	4 6 8
1,895,445	,,	Jan. 16	3	Do. 3 p.c. Deb.	83—85	..	3 10 7
209,820	Stk	Sept. 13	8	South Shields Con. Stk.	154—156	..	5 2 7
605,000	Stk.	Aug. 15	5⅜†	S'th Suburb'n Ord. 5 p.c.	118—121	..	4 8 1
60,000	,,	,,	5	Do. 5 p.c. Pref.	120—123	..	4 1 4
117,058	,,	Jan. 16	5	Do. 5 p.c. Deb. Stk.	120—125	..	4 0 0
502,310	Stk.	Nov. 14	5	Southampton Ord.	107—112	+3	4 9 3
120,000	Stk.	Aug. 15	6⅜	Tottenham A 5 p.c.	121—124	..	5 8 10
398,940	,,	,,	5¼	and B 3½ p.c.	102—105	..	5 0 0
149,470	,,	Dec. 13	4	Edmonton 4 p.c. Deb.	98—101	..	3 19 3
182,380	10	Dec. 30	8	Tuscan, Ltd.	10¼—10⅝	..	7 8 10
149,900	10	Jan. 2	5	Do. 5 p.c. Deb. Red.	98—100	..	5 0 0
193,742	Stk.	Aug. 29	5	Tynemouth 5 p.c. max.	107—109	..	4 11 9
30,000	Stk.	Feb. 14	8	Wands- A 5 p.c.	—	..	—
255,636	,,	Feb. 13	6⅜	worth B 3½ p.c.	125—130*	..	5 0 0
75,000	,,	,,	5⅝	and C 3½ p.c.	—	..	—
80,075	,,	Dec. 30	3	Putney 3 p.c. Deb. Stk.	73—78	..	3 16 11
845,872	,,	Aug. 15	5⅜	West Ham 5 p.c. Ord.	103—106	..	4 16 6
165,000	,,	,,	5	Do. 5 p.c. Pref.	119—121	+1	4 2 8
228,300	,,	Dec. 30	4	Do. 4 p.c. Deb. Stk.	102—107	..	3 14 9

Prices marked * are "Ex div." † Next dividend will be at this rate.

2⅞d. to 3d. Creosote, Midlands, 2⅜d. Carbolic acid, 60 per cent., casks included, east coast 1s. 6¾d. to 1s. 7d., west coast 1s. 6¼d. to 1s. 6½d. Naphthalene, £4 10s. to £8 10s.; salts, 42s. 6d. to 45s., packages included and f.o.b. Anthracene, "A" quality, 1½d. to 1¾d. per unit, packages included and delivered.

Sulphate of Ammonia.

This article is somewhat quiet, but prices are fairly well maintained. London manufacturers are asking £12 5s. Outside makes can be bought on Beckton terms at £11 17s. 6d. to £11 18s. 9d.; Hull, £11 18s. 9d. to £12; and Liverpool, £12. In Leith, sellers still ask £12 2s. 6d.; but only £12 is offered.

COAL TRADE REPORTS.

Lancashire Coal Trade.

The general condition of the Lancashire coal trade remains satisfactory from the coalowners' point of view. Prices show no alteration. The demand is strong and regular. Gas coal and cannel, however, are less pressing. It is reported that prices in West Yorkshire are easier. There has also been a slight reduction in South Wales. The healthy state of the cotton and engineering trades indicates that fuel for steam purposes will serve to keep Lancashire miners busy for a long time to come. Shipping coal is in good request. Coke for blasting and metal furnaces is a trifle cheaper.

Northern Coal Trade.

There has been a steadier tone in the steam coal trade; but the anticipations of more labour troubles have depressed some of the branches of the Durham coal trade. Best Northumbrian steam coals are steady at about 12s. per ton f.o.b., second-class steams are rather plentiful at 11s., and steam smalls are 6s. The collieries are working fully for this season of the year, when there are usually limited exports. In the gas coal trade, the demand has been steady, but not pressing; and the output has been well taken up, even if the quantities sent to the South have been less than usual. Durham gas coals vary in price, according to quality, from about 10s. to 11s. 6d.; but as high as 13s. is still asked for special Wear qualities. The Riga gas-works have placed one contract locally for some 8000 tons, and have others yet to place; while the larger Berlin contracts are in the market. Some disappointment is felt as to the results of the tenders for Amsterdam, which takes yearly some 200,000 tons of coal, and has of late divided its orders between this district and Westphalia. This year, the whole of the contract is said to have been placed in Germany; but the prices are not yet reported. In the coal trade, the new Eight Hours Bill, just introduced into Parliament, is looked on with apprehension, as being likely to advance costs of production. Coke is steady; and gas coke shows little change. Good gas coke is 18s. per ton f.o.b.

Scotch Coal Trade.

Though prices are still going down, it is reported that foreign buyers are now in the market, and that the expectation of coalowners is that the bottom has been about reached. Whether or not this be realized, it is certain that forward sales are getting more numerous. The prices quoted are: Ell 11s. to 12s. per ton f.o.b. Glasgow, splint 11s. 9d. to 12s., and steam 11s. to 11s. 3d. The shipments for the week amounted to 195,427 tons—a decrease of 33,759 tons upon the previous week, and 61,429 tons upon the corresponding week of last year. For the year to date, the total shipments have been 1,355,261 tons—a decrease of 220,589 tons upon the corresponding period of 1908.

Sale of Stock.—At Sunderland last week, Mr. Atkinson Gibson sold by auction £20,000 worth of additional ordinary capital stock of the Sunderland and South Shields Water Company, having a maximum dividend of 5 per cent. The prices realized varied from £119 to £112 per £100 of stock.

Suicide by Gas at Tooting.—An inquest was held last Saturday on the body of Thomas G. Hemmings, aged 41, of Upper Tooting, who died from gas poisoning. It was stated that he was found on the premises of his employers, a firm of gas-stove makers in Great Ormond Street, having poisoned himself by inhaling gas from a piece of tubing attached to a jet. Deceased was Secretary of a Friendly Society; and officers of the Society expressed the opinion that his accounts were not in a satisfactory condition. A verdict of "Suicide while of unsound mind" was returned.

The Bognor Urban Council and the Gas Company's Bill.—A Sub-Committee of the Bognor Urban District Council, having considered the Bill of the Bognor Gas Company, decided to appoint a deputation to ask the Company for a guarantee that the price of gas in the town should not be raised in order to make up possible losses on their proposed extended district, and that they would not erect any further manufacturing works or storage in the district of the Council. This report was formally approved at a special meeting of the Council on Monday last week, when the Clerk reported that the Directors of the Company had agreed to these proposals, and further that the price of gas in the new district should be charged at a sufficient covering price of not less than 6d. per 1000 cubic feet over the price in the existing limits of supply for the time being, and, failing this, that the portion of the Bill relating to the new district, with the exception of Pagham, would be withdrawn. The Clerk read a letter he had received from the Company that day, to the effect that the provisions of the clauses governing the outlying parishes had been unanimously accepted by the parishes therein mentioned—viz., that the price of gas should be an additional 6d. per 1000 cubic feet. It was unanimously decided that a petition should be lodged against the Bill, but that the Company should be informed that it would be withdrawn on the conditions referred to, and on the understanding that the minimum charge for gas in the new district should be an additional 6d. per 1000 feet.

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Feb. 6, 1908. (Signed) C. E. MACRONE.

We shall be happy to reply to any enquiry respecting Church, Shop, Factory, or Domestic Lighting, and to prove by the many testimonials (which can be seen) the extraordinarily good results obtained in each of these departments by the **"BLAND" Light.**

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Telegrams: "BLANLITE, LONDON." "GASBURNERS, MANCHESTER."
Telephones: 9239 London Wall and 4168 Central, Manchester.

Death by Gas at Hanley.—As Mr. John Jeffries, a music teacher at Hanley, did not appear at breakfast time one morning last week, his bedroom door was burst open, and he was found dead on the floor, with a rug over his head. Under the rug was an india-rubber tube, one end of which was fixed to the gas-jet, while the other was close to deceased's mouth.

Electric Light Failure at Southport.—Southport had the unpleasant experience, on Monday of last week, of a breakdown at the electricity works which for a time cut off the current. For some minutes the performance at the theatre had to be suspended; while traffic was stopped, to prevent accidents, in some of the principal thoroughfares while they remained in darkness.

Suicide by Gas at West Ham.—A verdict of "Suicide while temporarily insane" was returned by a West Ham Coroner's Jury in the case of Richard Hutchins, an estate agent, of Plaistow. Last Tuesday morning his wife found him lying on the scullery floor, with his head in the gas-oven, all the taps of which had been turned on. Medical evidence showed that death was due to coal-gas poisoning.

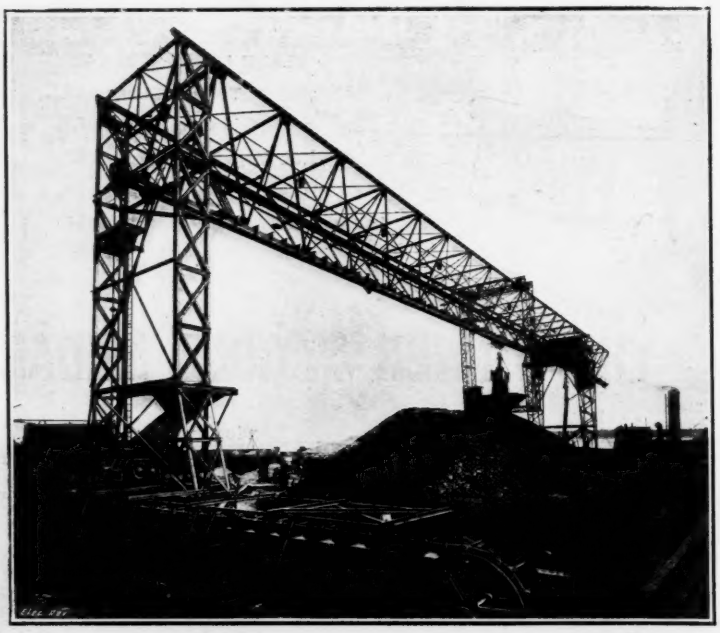
Reduction to Large Consumers at Smethwick.—The Gas Committee reported to the Smethwick Town Council last week that they had considered the question of the price of gas to large consumers. In 1904, a concession equal to 2d. per 1000 cubic feet was made to the prepayment consumers; and in 1906, a reduction of 2d. per 1000 cubic feet was made to consumers of under 50,000 cubic feet per quarter. But large consumers had received no relief; and the Committee had come to the conclusion that, having regard to the competition for this class of customers, the time had arrived when something should be done to meet it. They recommended that the price of gas to consumers of from 50,000 to 500,000 cubic feet per quarter be reduced from 2s. 4d. to 2s. 3d. per 1000 cubic feet, and to consumers of 500,000 cubic feet and upwards to 2s. 2d. This was agreed to.

A Sulphate Plant for Mansfield.—In the course of an inquiry held by Mr. A. G. Drury, on behalf of the Local Government Board, into an application by the Mansfield Town Council for sanction to borrow £1100 for the provision of a sulphate plant at the gas-works, the Town Clerk (Mr. J. H. White) explained that the matter of procuring a sulphate plant had been under the consideration of the Council for some years. The Gas Engineer (Mr. A. Graham) had strongly recommended it; and in October last the Council passed a resolution to make application for a loan. The old plant was constructed in 1882; and the first year's working showed a net profit of £194. The plant continued to work until 1893, when it appeared that, owing to the decrease in the price obtained for sulphate of ammonia, it was being carried on at a loss; and it was decided to discontinue making sulphate. The old plant had been "scrapped." The Engineer believed it would be advisable for the Corporation to manufacture their own sulphate. Mr. Graham explained the Council's proposals, to which there was no opposition.

Electricity not Favoured at Douglas.—The Douglas Town Council have declined to authorize a Special Committee (who were appointed to inquire into the advisability of providing an electrical plant for the town) to engage an expert to advise them with regard to the cost and feasibility of producing electricity by water power from the reservoir to supply the town with light and work the borough trams. It was stated that to electrify the trams on the Douglas Promenade and in the upper town would cost from £70,000 to £80,000, and reduce three-fourths of the present system, which cost £59,000, to the scrap-heap. The profits of £6000 a year would be turned into a deficit; and the town could not face the risk for the sake of such doubtful advantages. It was also argued that the present lighting of the streets is satisfactory.

Councillor and Gas Company at Normanton.—The report for the half year to Dec. 31, which was adopted at the meeting of the Normanton Gas Company, showed a profit of £2040; the amount available for distribution, after providing interest on mortgages, being £3973, out of which the Directors recommended dividends of 5½ per cent. on the original stock and 4 per cent. on the additional stock. The Chairman (Mr. E. Mitchell) remarked that a statement had been made at a meeting of the Normanton Urban District Council to the effect that the Company had been dealing unfairly with the Council with respect to their charges. This was absolutely devoid of foundation, so far as the Directors were aware. They expected criticism, and did not object to it when it was fair and respectful; but this was of such a character that they had decided to place the matter in their Solicitors' hands, to give the Councillor who made the charge an opportunity either of substantiating his statement or of withdrawing it.

Further Powers for the Camborne Water Company.—Presiding at the recent half-yearly meeting of the Camborne Water Company, the Chairman (Mr. W. C. Pendarves) referred to the Bill which the Company are promoting to obtain power to raise additional capital to the extent of £25,000. He explained that the more populous parts of the district required a great deal more water than hitherto. In Camborne itself a large number of small houses requiring little water had been replaced by others having modern conveniences, and consequently demanding an increased supply. In the eastern part of the district, a larger main was needed to serve the houses and the Redruth Workhouse. Mr. Chapman, the Water Engineer of the Torquay Corporation, had been consulted, and he strongly advised the Company to construct a supplementary reservoir at Boswyn, where they had a quantity of water running to waste. Land had, therefore, been purchased for a reservoir to hold 3 million gallons, and also for filter-beds. It was estimated that these works would cost £10,000; and the Company would have a substantial balance of unexpended capital to provide for further extensions without the need of another application to Parliament. The meeting approved of the Directors' recommendation that dividends of 8 per cent. on the "A" shares and £5 12s. per cent. on the "B" shares be paid. The Company's Bill was referred to at the last meeting of the Urban District Council, and a resolution in support of their action was carried unanimously.



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Reduction in Price of Gas at Exeter.

The welcome announcement is made by the Exeter Gas Company that the price of gas to all their consumers has been reduced by 2d. per 1000 cubic feet. This will make the charge in the current quarter 2s. 9d. per 1000 feet. One of the local newspapers, commenting on the reduction, suggests that it is due in part to the fact that the Company have obtained cheaper coal from the Midlands than they got from the North, and have also saved money in cost of carriage by having their supplies by rail instead of by sea. The loss to the city in canal dues—of which a point has been made since the Company ceased to use sea-borne coal—will, it is pointed out, be more than compensated for by the decrease in the price of gas. As to street lighting, it is admitted by apologists for the municipal electric lighting undertaking that electricity costs more than gas; but credit is claimed for electric lighting because the effect of the competition has been to bring about a reduction in the charges for gas in the streets in which it is used, while there is improved lighting all round. The fact that the lighting would be at least as good as it is now, and very much cheaper, if gas were used in all the streets, is conveniently ignored. The Electric Lighting Committee are, however, admonished that they must reduce the charge for current for lighting purposes if they are to compete on anything like equal terms with the Gas Company.

Public Lighting by Gas at Stepney.—According to the annual report of the Stepney Borough Council for the year ended March 31, 1907, which has just been issued, the total number of gas-lamps in use at the close of the year was 2890, of which 2853 were single-burner lamps, and 37 two and three flame lamps. The Gaslight and Coke Company supplied 43, and the Commercial Gas Company all the remainder. At the end of March, 1906, the total number of gas-lamps was 2912; consequently 22 lamps were discontinued during the period ended March, 1907, principally owing to the extension of municipal electric lighting. The average number of hours' burning of the gas-lamps for the year was 4300, compared with the 3989·49 of the electric lamps. It was found necessary, for the more efficient illumination of the streets, to put into use one new double-burner and twelve new single-burner lamps during the twelve months. The total year's expenditure involved in public street lighting was £15,928, of which £8492 was spent in gas, including the lighting and maintenance of the lamps, and £127 11s. 10d. for their alteration and repair. The report says the vast improvement that has been brought about within the past five years in the lighting of the borough is unquestionable; while the cost of lighting the public streets for the respective years 1901-2 and 1906-7 remains practically unchanged. The cost in the former year was £15,888.

The Beaconsfield Gas Company is to be wound up voluntarily, with Mr. E. A. Wingrove, of Beaconsfield, as Liquidator.

The Water and Gas Debenture and Share Corporation have declared a dividend of 10 per cent. on the ordinary shares and 6 per cent. on the preference shares, less income-tax, for the past year.

The Directors of the Bedford Gas Company have offered a reward of £50 for such information as will lead to the discovery of the offender in connection with the temporary interruption of the gas supply to the town, of which particulars were given in the "JOURNAL" last week (p. 435).

Among other places which suffered from the effects of the severe gale last Saturday was Morecambe, where huge seas inundated the whole length of the sea-front promenade, nearly 40 yards of which was torn away. The result was the swamping of the electric light cables, and plunging the Esplanade in darkness.

The Oldham Corporation have placed an order with Messrs. Robert Dempster and Sons, Limited, of Elland, for four purifiers, 25 ft. 5 in. square and 6 feet deep, complete with staging, oxide elevator, &c. The work has to be carried out under the supervision of, and to plans prepared by, Mr. T. Duxbury, the Corporation Gas Engineer.

At Harrogate last Friday, Mr. W. O. E. Meade-King, M.Inst.C.E., held a Local Government Board inquiry relative to the application of the Corporation for sanction to the borrowing of £5000 for the extension of water-mains in the urban district of Knaresborough, and parish of Scriven, and the erection of a house for the inspector of mains.

The members of the Skipton Urban District Council, after having discussed for a considerable time the advantages of mechanical stoking compared with hand stoking at the gas-works, and a report on visits by the Gas Committee to works where mechanical stoking is employed, decided, with one dissentient, in favour of the principle of mechanical stoking.

At a meeting of the Lighting Sub-Committee of the Liverpool Corporation last Thursday, the Superintendent of Street Lighting reported that since the previous meeting he had dealt with seven applications for the testing of consumers' gas pipes and fittings, all of which were found to be unsound, causing escapes of gas at the aggregate rate of 2·05 cubic feet per hour, representing an annual loss, with gas at 2s. 6d. per 1000 cubic feet, of £2 4s. 11d.

The Inspectors' Maintenance Department of the South Metropolitan Gas Company held their third annual dinner and concert at the Manchester Hotel on the 15th inst.—Mr. E. Hewes occupying the chair. The principal event of the evening was the presentation by the Chairman, on behalf of the maintenance staff, of a handsome engraved silver coffee service, as a mark of esteem, to Mr. Edwards, the chief of the department. The recipient, who was greatly surprised at the gift, thanked the men for it; saying that it would be held by him as a priceless treasure. He also expressed his thanks for their appreciation of him. During the evening, an excellent programme of music was gone through, under the direction of Mr. Percy Taylor; and the singing of "Auld Lang Syne" brought to a close one of the most pleasant functions the department has had—the large number of visitors present from various departments testifying to the good-fellowship existing throughout the great establishment in which they are all co-partners.

THE FIRES
of the
Current Season

IT has been proved that the Two Months **after** December are colder than those preceding the Xmas Month—

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THERE will be therefore still a demand for the **latest** and **most up-to-date** Fires such as the

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ALL orders for these Stoves will be despatched at once.

The "Wizard."

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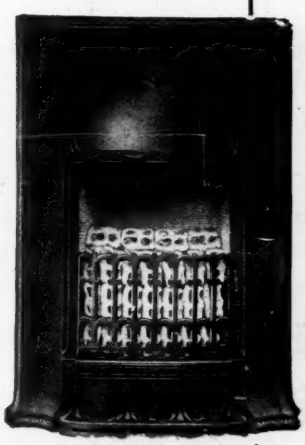

The "Mascot."

"ILLUMINATING TRUTHS."

LEAFLETS FOR DISTRIBUTION.

No. 1.—"The Sanitary Aspects of Gas and Electric Lighting."
No. 2.—"The Cleanliness of Illuminants: The Eyesight."
No. 3.—"Fire Risks."
No. 4.—"The Relative Cost of Gas and Electricity, and Matters affecting it."
No. 5.—"On Reliability, with Instances of Misplaced Confidence."
No. 6.—"On Shop Lighting, with Special Reference to the Flame Arc Lamp."
No. 7.—"The Osram Lamp: Fiction and Fact."

This series of Leaflets will be useful, not only for distribution among Householders generally, but for circulation among Shareholders to fortify them with arguments in defence of the commodity in which they have invested capital. Copies of each Leaflet should also be kept in every Gas Undertaking's Show-Rooms.

Prices for Quantities on Application to WALTER KING, 11, BOLT COURT, FLEET STREET, E.C.

WANTED, FOR SALE, CONTRACT, &c., ADVERTISEMENTS IN THIS WEEK'S "JOURNAL."

Situations Vacant.

MANAGER (VANCOUVER). L. M. T., c/o Street's, Cornhill.
SUPERINTENDENT (FITTINGS DEPARTMENT). Sheffield Gaslight Company. Applications by March 13.
WORKS SUPERINTENDENT. Walsall Gas Department. Applications by March 7.
WORKS FOREMAN. Walsall Gas Department. Applications by March 7.
CHIEF CLERK. Gas and Water Offices, Holyhead.
CHARGE OF METER SHOP. Coventry Gas Department.
REPRESENTATIVE. No. 4913.
WORKING MANAGER. East Sussex Gaslight and Coke Company.
AGENT. No. 4908.
SERVICE LAYER, &c. Cudworth Gas and Water Department. Applications by March 10.

Situation Wanted.

MANAGER OR ASSISTANT. No. 4910.

Company Meeting.

CAGLIARI GAS AND WATER COMPANY. London Offices, March 3, Three o'clock.

Stocks and Shares.

COLNE VALLEY WATER COMPANY. March 18.
CROYDON GAS COMPANY. March 3.
ENFIELD GAS COMPANY. March 3.
GRAVESEND AND MILTON GAS COMPANY. March 3.
ROMFORD GAS COMPANY. March 3.
ROMFORD GAS COMPANY. March 17.
SOUTHEND WATER COMPANY. March 3.
SOUTH SUBURBAN GAS COMPANY. March 3.
WEST KENT GAS COMPANY. March 3.

TENDERS FOR

Benzol.

MIDDLETON CORPORATION. Tenders by Feb. 29.

Brass and Gun Metal Taps and Fittings, &c.

MIDDLETON CORPORATION. Tenders by Feb. 29.
RHONDDA GAS AND WATER DEPARTMENT. Tenders by March 4.

Coal and Cannel.

SALFORD GAS DEPARTMENT. Tenders by March 12.
STOCKPORT GAS DEPARTMENT. Tenders by March 2.

Fire-Clay Goods, &c.

RHONDDA GAS DEPARTMENT. Tenders by March 4.

Gasholders, &c.

CEFN MAWR AND RHOSYMEDRE GAS COMPANY (TELESCOPING).
WEST BROMWICH GAS DEPARTMENT (ADDITIONAL LIFT). Tenders by March 7.

General Stores (Oils, Lime, Paint, Lead Pipe, Ironmongery, &c., &c.)

BRIGHOUSE TOWN COUNCIL. Tenders by March 4.
MIDDLETON CORPORATION. Tenders by Feb. 29.
RHONDDA GAS AND WATER DEPARTMENT. Tenders by March 4.

Mantles, &c.

LONDON COUNTY COUNCIL. Tenders by March 10.

Meters.

BRIGHOUSE GAS DEPARTMENT. Tenders by March 7.
LLANDUDNO URBAN DISTRICT COUNCIL. Tenders by Feb. 29.
MIDDLETON CORPORATION. Tenders by Feb. 29.
RHONDDA GAS DEPARTMENT. Tenders by March 4.

Oil for Gas Manufacture.

CARLISLE GAS DEPARTMENT. Tenders by March 2.

Oxide of Iron (New and Spent).

CARLISLE GAS DEPARTMENT. Tenders by March 2.
RHONDDA GAS DEPARTMENT. Tenders by March 4.

Pipes, &c.

BRIGHOUSE TOWN COUNCIL. Tenders by March 4.
MIDDLETON CORPORATION. Tenders by Feb. 29.
RHONDDA GAS AND WATER DEPARTMENT. Tenders by March 4.

Purifiers.

HATHERSAGE AND DISTRICT GAS COMPANY. Tenders by March 5.

Sulphuric Acid.

MIDDLETON CORPORATION. Tenders by Feb. 29.
RAMSGATE GAS DEPAKTMENT. Tenders by March 7.

Tar.

CARLISLE GAS DEPARTMENT. Tenders by March 2.
EXETER GAS COMPANY. Tenders by March 8.
RAMSGATE GAS DEPARTMENT. Tenders by March 7.

NOTICES TO CORRESPONDENTS, ADVERTISERS, AND SUBSCRIBERS.

No notice can be taken of anonymous communications. Whatever is intended for insertion in the "JOURNAL" must be authenticated by the name and address of the writer; not necessarily for publication, but as a proof of good faith.

COPY FOR ADVERTISEMENTS for the "JOURNAL" should be received at the Office NOT LATER than TWELVE O'CLOCK NOON ON MONDAY, to ensure insertion in the following day's issue.

Orders for Alterations in, or stoppages of, PERMANENT ADVERTISEMENTS should be received by the FIRST POST on SATURDAY.

Wanted, For Sale, and Tender Advertisements, Six Lines and under, 3s.; each additional Line, 6d.

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Resists 4500° Fahr. Best for GAS-WORKS.
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